FCC - TEST REPORT

Report Number	: **68.950.23.0848.01**	Date of Issue:	**2023-11-06**
Model	: **P53300-0111**		
Product Type	: Persee 2		
Applicant	: ORBBEC INC.		
Address	: 11-13/F, Union Tower Hi-tech Zone, No.63 Xuefu Rd., Nanshan Dist., Shenzhen, China		
Manufacturer	: ORBBEC INC.		
Address	: 11-13/F, Union Tower Hi-tech Zone, No.63 Xuefu Rd., Nanshan Dist., Shenzhen, China		
Test Result	: **n Positive o Negative**		
Total pages including Appendices	: **67**		

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2 Details about the Test Laboratory

Details about the Test Laboratory
Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
	Building 12 & 13, Zhiheng Wisdomland Business Park, Guankou Erlu, Nantou, Nanshan District, Shenzhen, Guangdong, China
Telephone:	86 755 8828 6998
Fax:	86 755 8828 5299
FCC Registration No.:	514049
FCC Designation Number:	CN5009

3 Description of the Equipment Under Test

Product:	Persee 2
Model no.:	P53300-0111
FCC ID:	2A2CLP53300-0111
Options and accessories:	Adapter Model: TPQ-228F120200xW01 Input: 100-240VAC, 50/60Hz, 0.8A Output: 12V,2A Manufacturer: Shenzhen Tianyin Electronics CO., LTD.
Rating:	12.0VDC, 2.0A (powered by adapter)
RF Transmission Frequency:	2412MHz-2462MHz
No. of Operated Channel:	11
Modulation:	DSSS, OFDM
Antenna Type:	Internal antenna
Antenna Gain	Gain: 2.8dBi
Description of the EUT:	EUT is a Persee 2 with Bluetooth Low Energy/Bluetooth BDR+EDR, 2.4GHz Wi-Fi and 5GHz Wi-Fi functions
Remark:	This report only for 2.4GWiFi part.

NOTE 1: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2021 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB 558074 D01 15.247 Meas Guidance v05r02 Measurement Guidance and ANSI C63.10-2020.

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5 Summary of Test Results

Technical Requirements			
FCC Part 15 Subpart C			
Test Condition		Test Site	Test Result
§15.207	Conducted emission AC power port	Site 1	Pass
§15.247(b)(3)	Conducted peak output power	Site 1	Pass
§15.247(e)	Power spectral density	Site 1	Pass
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	Site 1	Pass
§15.247(d)	Spurious RF conducted emissions	Site 1	Pass
§15.247(d)	Band edge	Site 1	Pass
§15.247(d) & §15.209	Spurious radiated emissions for transmitter	Site 1	Pass
§15.203	Antenna requirement	See note 2	Pass

Note 1: N/A=Not Applicable.
Note 2: The EUT uses an internal antenna, which gain is 2.8dBi. In accordance to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2A2CLP53300-0111, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C rules.

SUMMARY:

All tests according to the regulations cited on page 5 were

n - Performed

o - **Not** Performed

The Equipment Under Test

n - **Fulfills** the general approval requirements.

o - **Does not** fulfill the general approval requirements.

Sample Received Date:	2023-09-27
Testing Start Date:	2023-09-27
Testing End Date:	2023-10-27

TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch

Reviewed by:	Prepared by:	Tested by:
John Zhi	Joe Gu	Carry Cai
Project Manager	Project Engineer	Test Engineer

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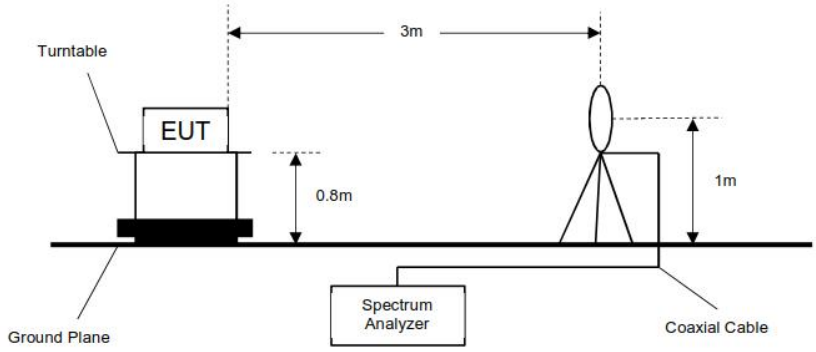
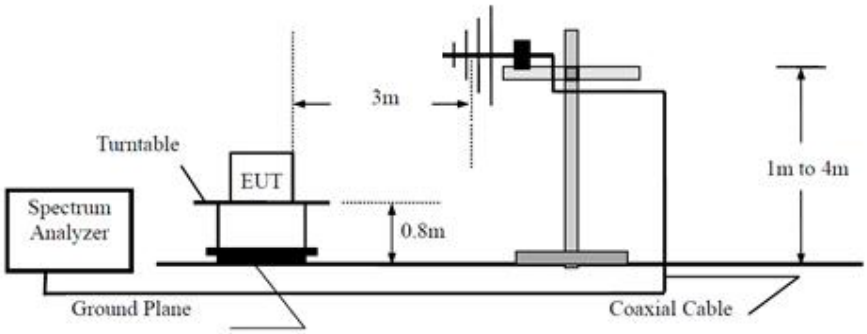
7 Test Setups

7.1 Radiated test setups

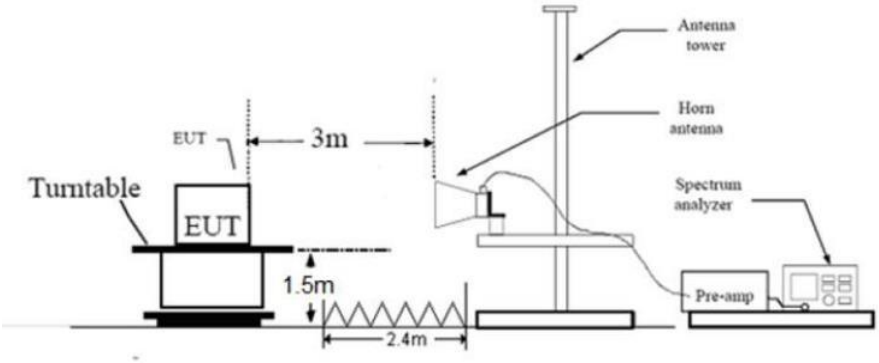
9KHz - 30MHz



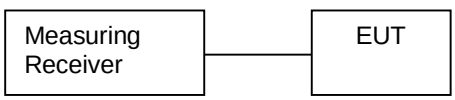
30MHz - 1GHz



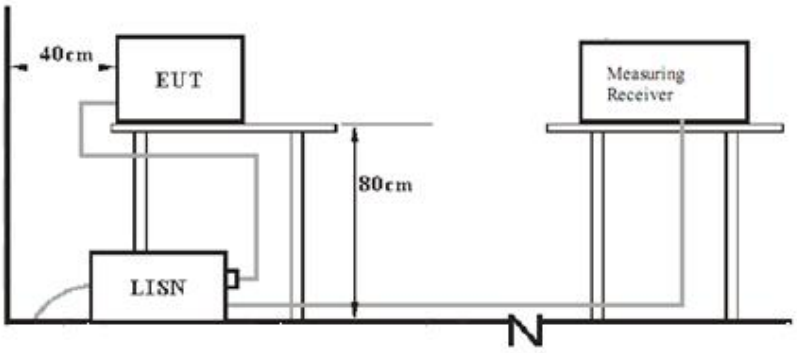
Above 1GHz



7.2 Conducted RF test setups



7.3 AC Power Line Conducted Emission test setups



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8 Systems Test Configuration

Auxiliary Equipment Used during Test:

Description	Manufacturer	Model NO.	S/N
Laptop	LENOVO	X200	--

Test Channel information:

Test Mode	**Channel (MHz)**		
802.11b	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11g	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz
802.11n HT20	CH 1: 2412MHz	CH 6: 2437MHz	CH 11: 2462MHz

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9 Technical Requirement

9.1 Conducted Emission

Test Method

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. Both sides of AC line were checked for maximum conducted interference.
6. The frequency range from 150 kHz to 30 MHz was searched.
7. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

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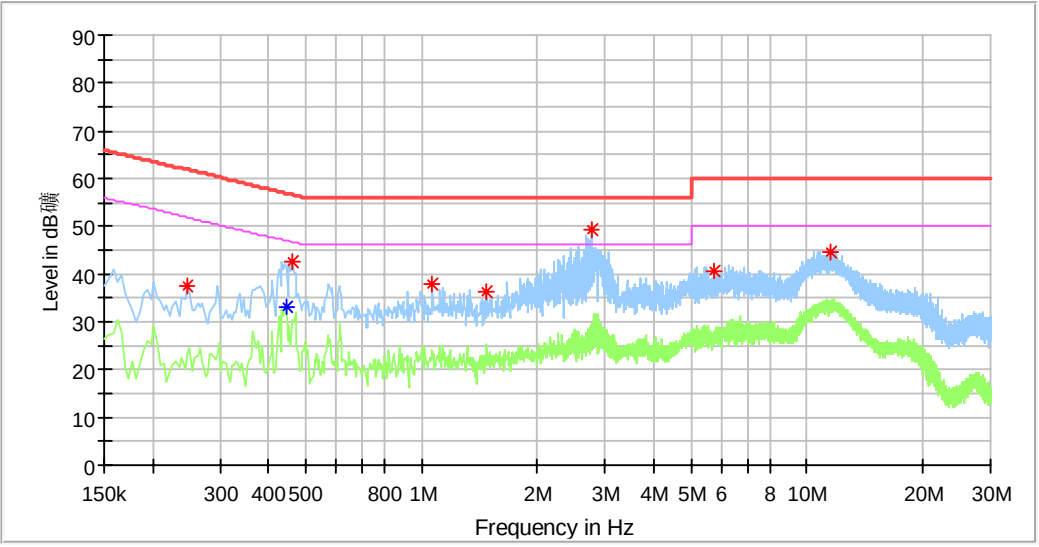
Conducted Emission

Product Type	:	Persee 2
M/N	:	P53300-0111
Operating Condition	:	Transmit
Test Specification	:	Line
Comment	:	AC 120V/60Hz (External adapter)



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.246000	37.46	---	61.89	24.43	L1	10.28
0.446000	---	33.25	46.95	13.70	L1	10.29
0.462000	42.76	---	56.66	13.90	L1	10.30
1.066000	37.77	---	56.00	18.23	L1	10.32
1.478000	36.36	---	56.00	19.64	L1	10.34
2.750000	49.46	---	56.00	6.54	L1	10.41
5.742000	40.57	---	60.00	19.43	L1	10.63
11.574000	44.79	---	60.00	15.21	L1	11.16

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
---	---	---	---	---		---

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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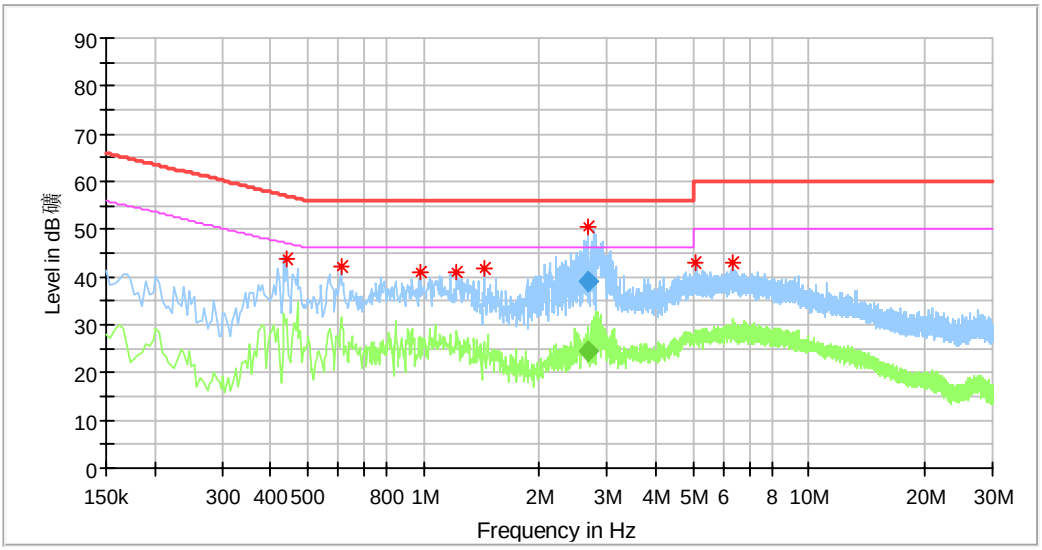
Conducted Emission

Product Type	:	Persee 2
M/N	:	P53300-0111
Operating Condition	:	Transmit
Test Specification	:	Neutral
Comment	:	AC 120V/60Hz (External adapter)



Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
0.442000	43.90	---	57.02	13.12	N	10.20
0.610000	42.10	---	56.00	13.90	N	10.19
0.978000	41.06	---	56.00	14.94	N	10.20
1.222000	41.19	---	56.00	14.81	N	10.22
1.438000	41.65	---	56.00	14.35	N	10.23
2.685500	50.47	---	56.00	5.53	N	10.32
5.074000	42.91	---	60.00	17.09	N	10.53
6.382000	42.96	---	60.00	17.04	N	10.67

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)
2.685500	---	24.50	46.00	21.50	N	10.32
2.685500	39.15	---	56.00	16.85	N	10.32

Remark：
Level=Reading Level + Correction Factor
Correction Factor=Cable Loss + LISN Factor
(The Reading Level is recorded by software which is not shown in the sheet)

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9.2 Conducted Output Power

Test Method

1. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:

The EUT is configured to transmit continuously or to transmit with a consistent duty cycle.
At all times when the EUT is transmitting, it must be transmitting at its maximum power control level. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.

2. If the transmitter does not transmit continuously, measure the duty cycle, x, of the transmitter output signal as described in 12.2 in C63.10-2020.
3. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
4. Adjust the measurement in dBm by adding 10 log (1/x) where x is the duty cycle (e.g., 10 log (1/0.25) if the duty cycle is 25%).

Limits

According to §15.247 (b) (1), conducted output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

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Test result as below table

802.11b_SISO modulation Test Result

Frequency (MHz)	Conducted Output Power (dBm)	Result
Low channel 2412MHz	14.3	Pass
Middle channel 2437MHz	14.5	Pass
High channel 2462MHz	14.7	Pass

802.11g_ SISO modulation Test Result

Frequency (MHz)	Conducted Output Power (dBm)	Result
Low channel 2412MHz	13.8	Pass
Middle channel 2437MHz	13.9	Pass
High channel 2462MHz	13.9	Pass

802.11n20_ SISO modulation Test Result

Frequency (MHz)	Conducted Output Power (dBm)	Result
Low channel 2412MHz	13.2	Pass
Middle channel 2437MHz	13.5	Pass
High channel 2462MHz	13.6	Pass

9.3 6dB Bandwidth

Test Method for 6 dB Bandwidth

1. Set center frequency to the nominal EUT channel center frequency
2. Set RBW = 100KHz
3. Set the video bandwidth (VBW) ≥ 3 × RBW
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = Sweep = No faster than coupled (auto) time.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.
9. Record the results in the test report.

Limit

Limit [kHz]
≥500

TestMode	Antenna	Channel [MHz]	6dB bandwidth [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	7.120	2408.440	2415.560	0.5	PASS
		2437	7.120	2433.440	2440.560	0.5	PASS
		2462	7.160	2458.400	2465.560	0.5	PASS
11G	Ant1	2412	15.560	2404.360	2419.920	0.5	PASS
		2437	15.560	2429.360	2444.920	0.5	PASS
		2462	15.240	2454.360	2469.600	0.5	PASS
11N20SISO	Ant1	2412	15.280	2404.360	2419.640	0.5	PASS
		2437	15.280	2429.360	2444.640	0.5	PASS
		2462	15.200	2454.400	2469.600	0.5	PASS

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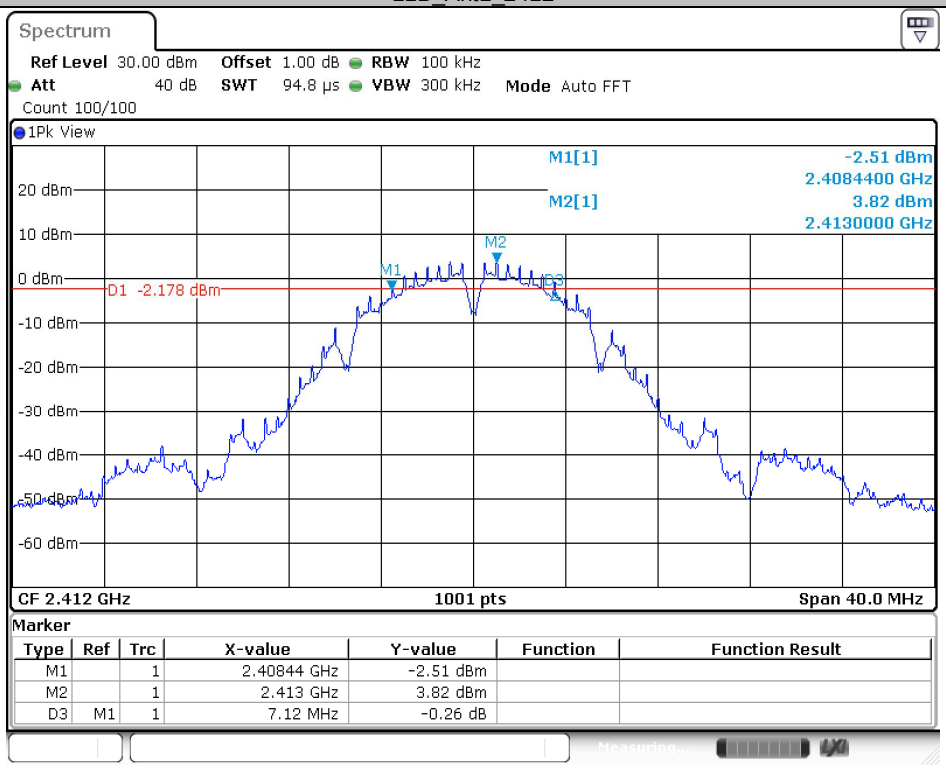

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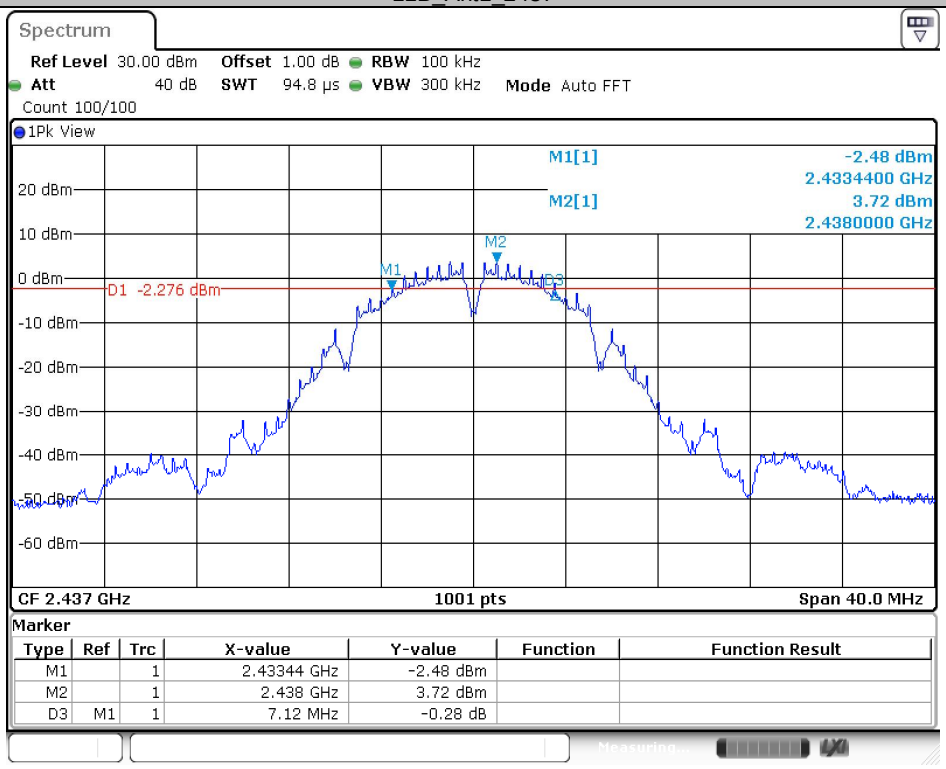

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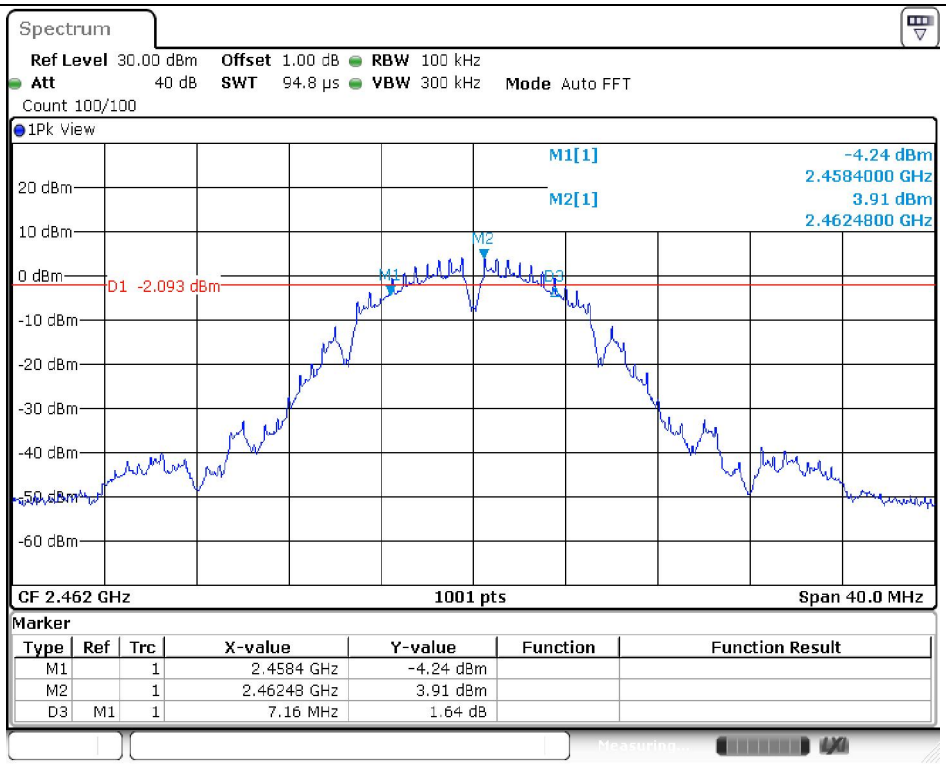

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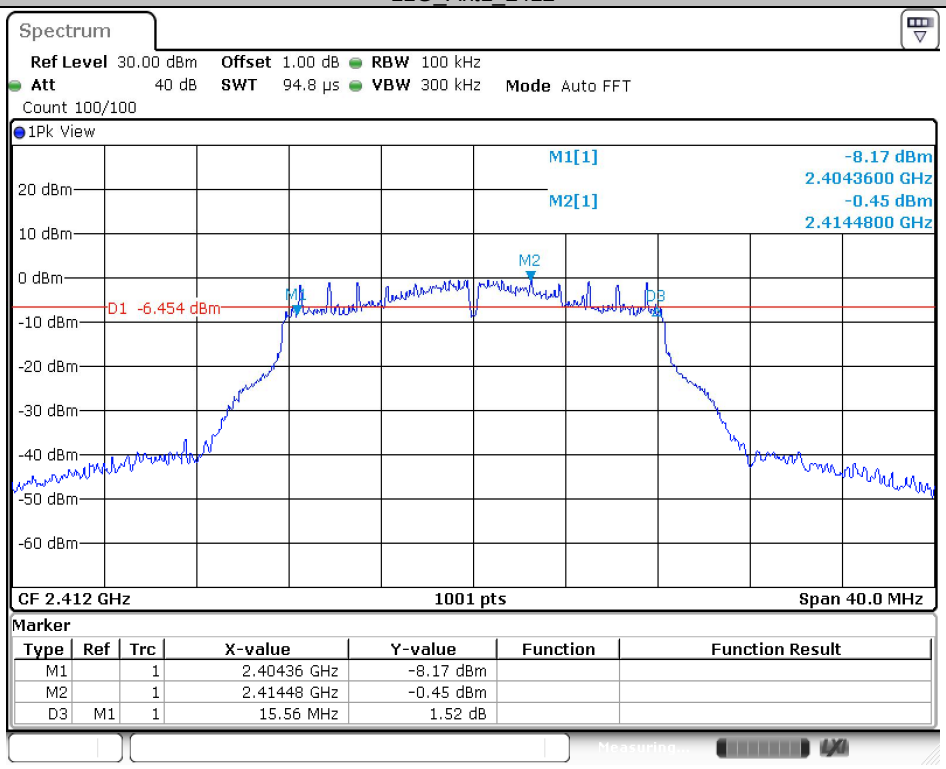

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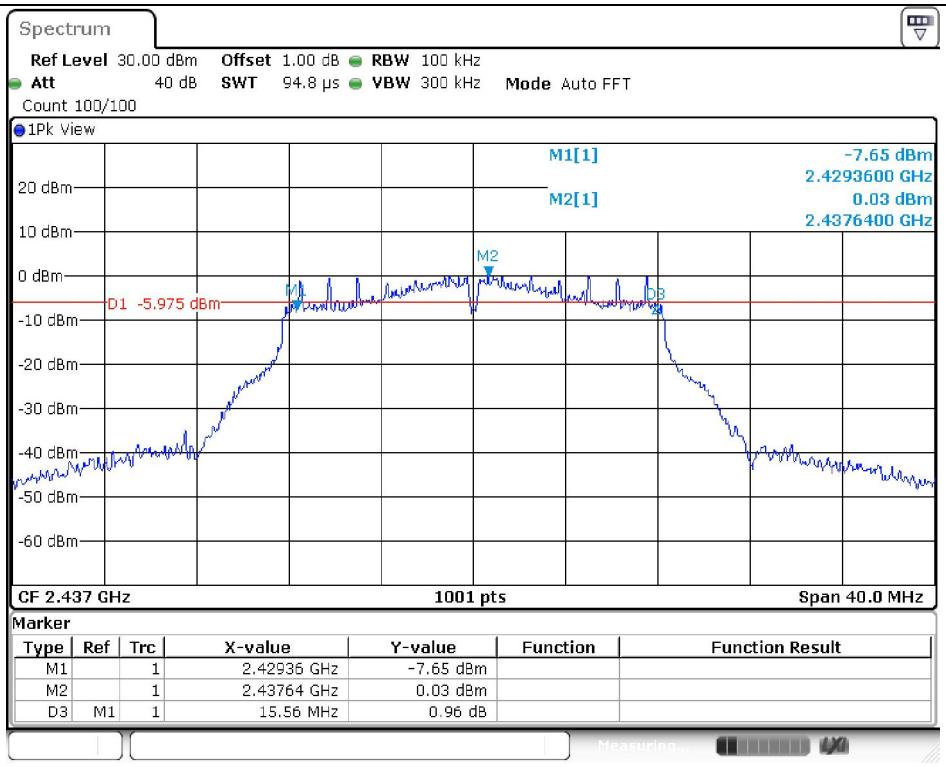

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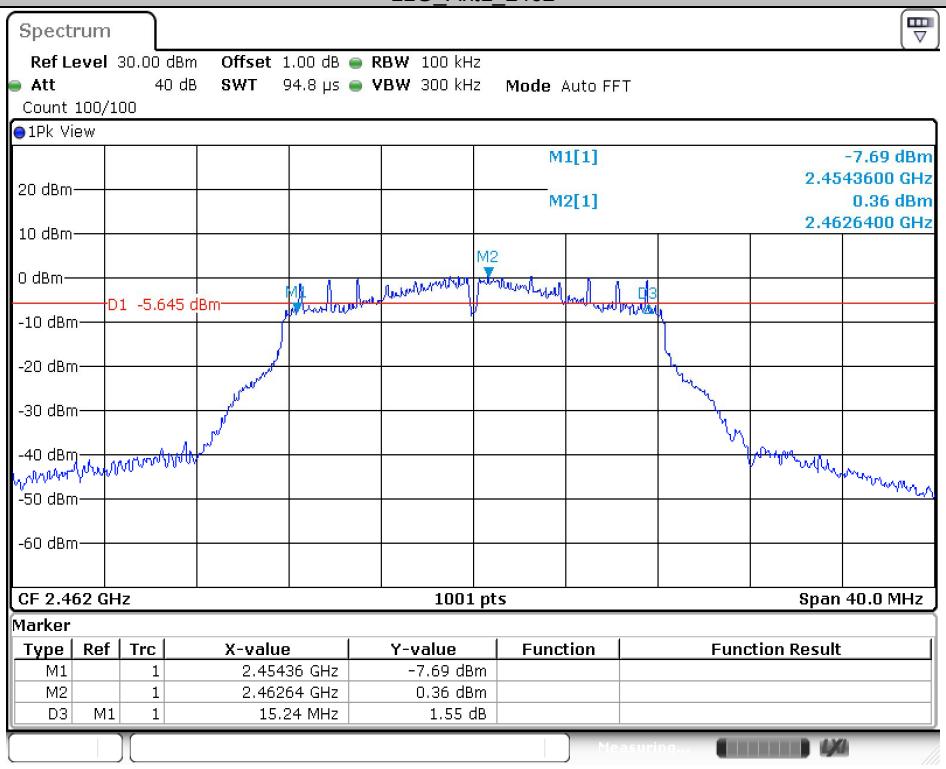

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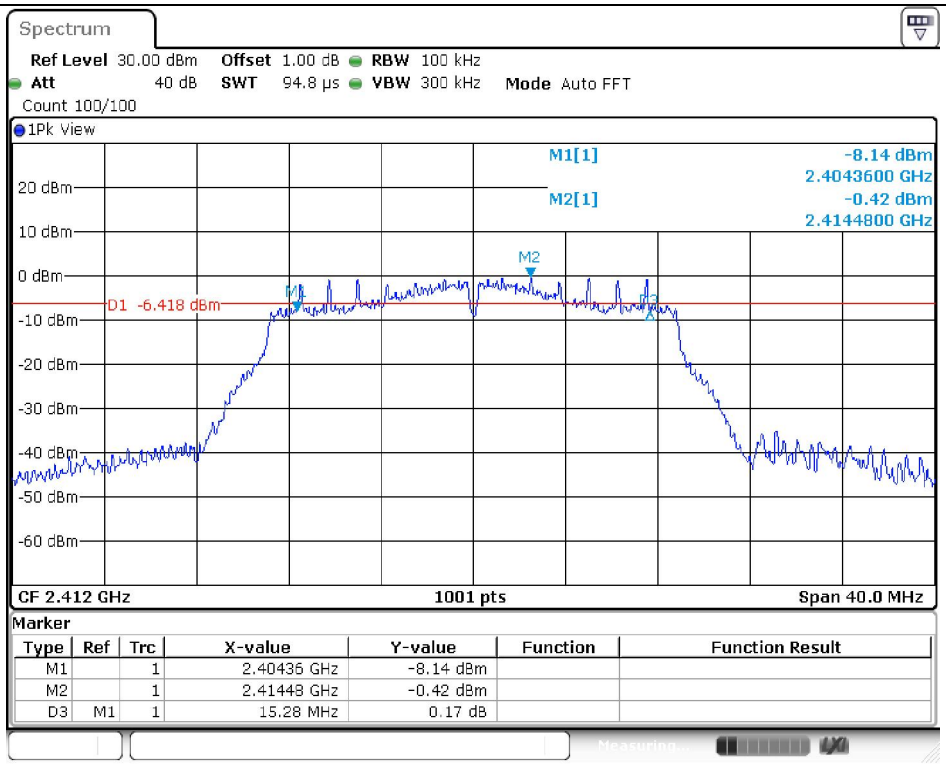

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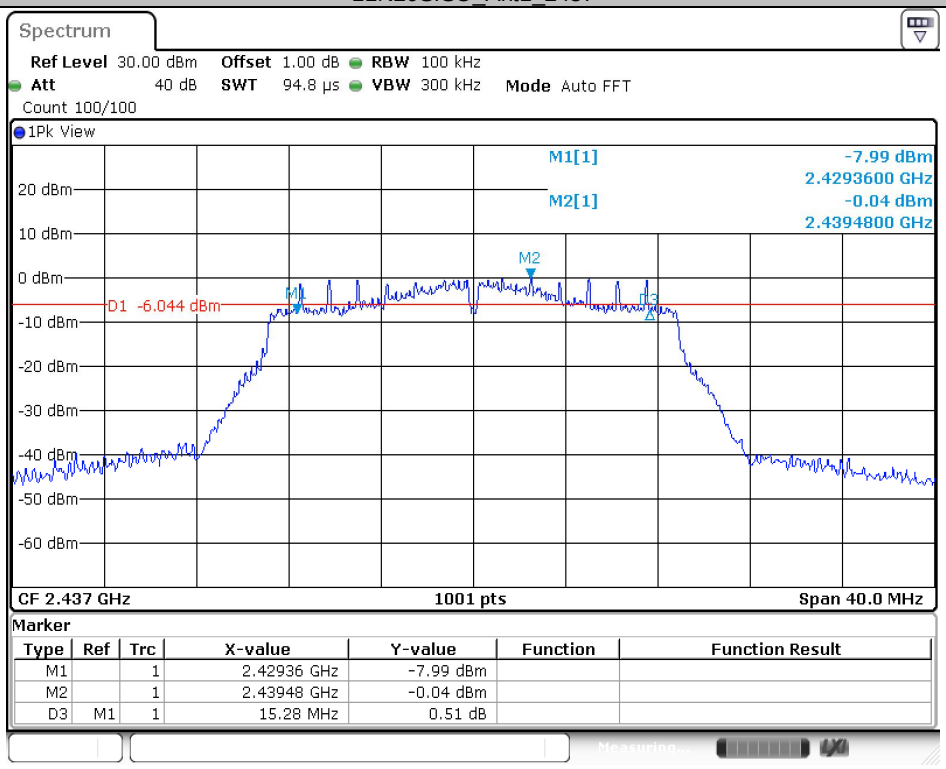

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11N20SISO_Ant1_2462

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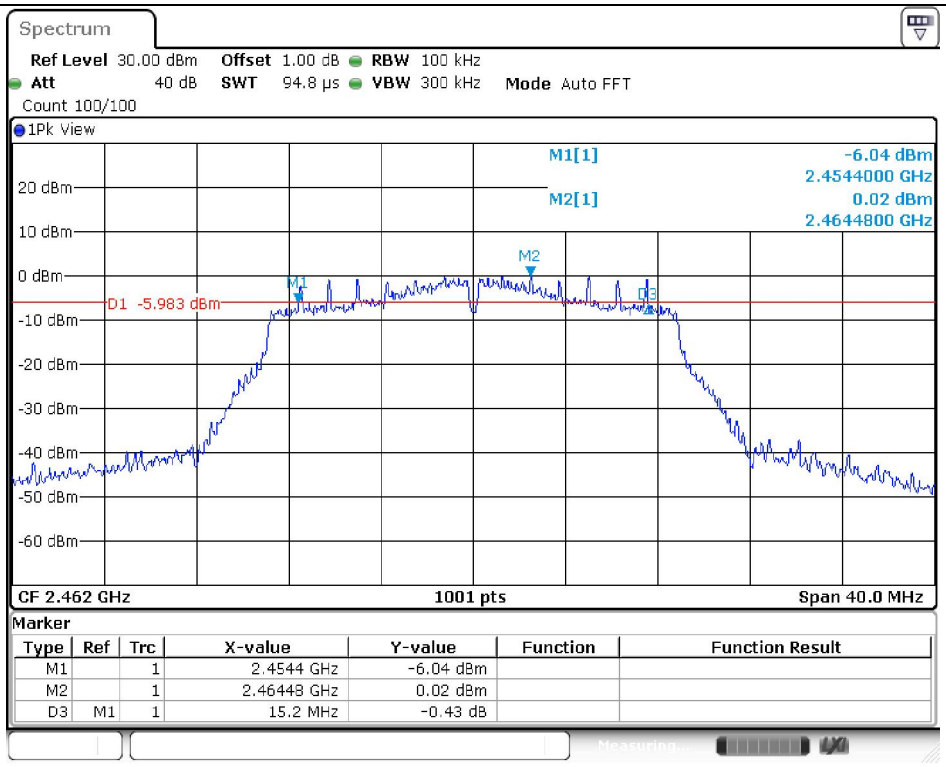

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9.4 99% Occupied Bandwidth

Test Method for 99 % Bandwidth

1. Set center frequency to the nominal EUT channel center frequency
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 RBW
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Use the 99 % power bandwidth function of the instrument.
9. Record the results in the test report.

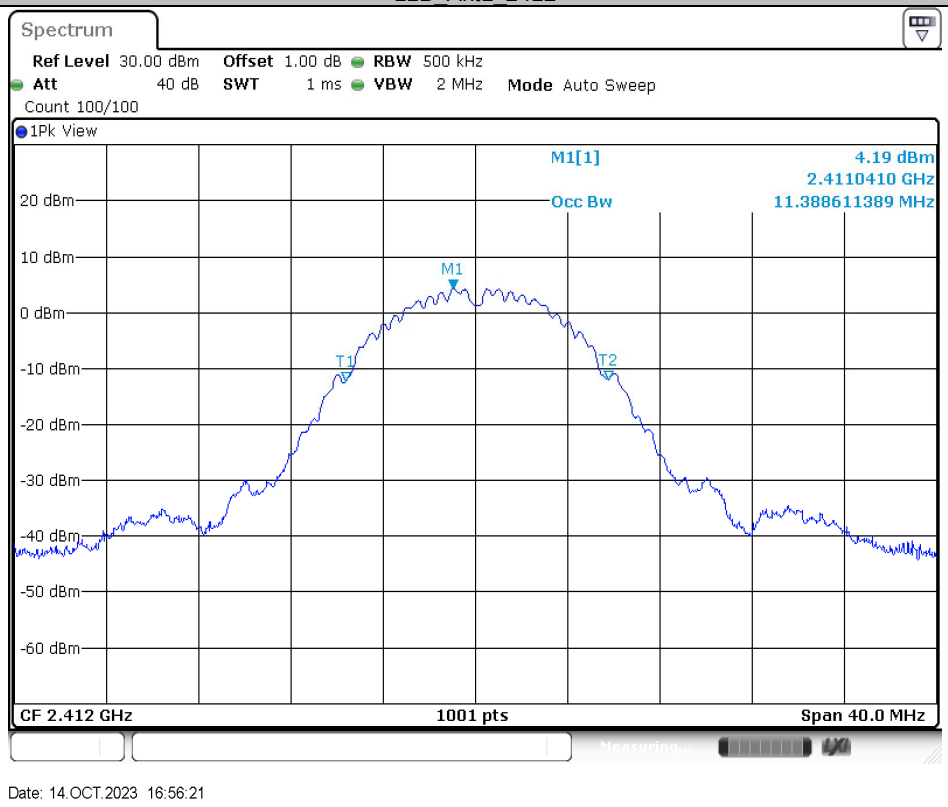
Limit

Limit [kHz]
--

TestMode	Antenna	Channel [MHz]	OCB [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	11.389	2406.366	2417.754	---	PASS
		2437	11.309	2431.406	2442.714	---	PASS
		2462	11.309	2456.406	2467.714	---	PASS
11G	Ant1	2412	17.423	2403.329	2420.751	---	PASS
		2437	17.423	2428.329	2445.751	---	PASS
		2462	17.183	2453.409	2470.591	---	PASS
11N20SISO	Ant1	2412	18.342	2402.889	2421.231	---	PASS
		2437	18.302	2427.889	2446.191	---	PASS
		2462	18.182	2452.969	2471.151	---	PASS

99% Bandwidth

11B_Ant1_2412



11B_Ant1_2437

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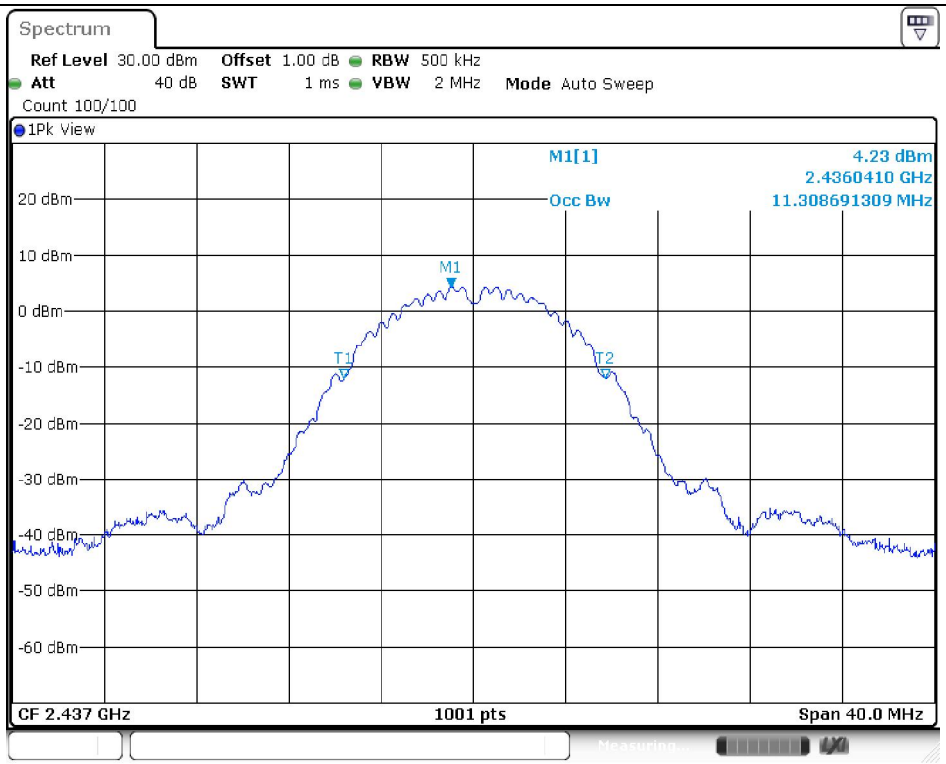
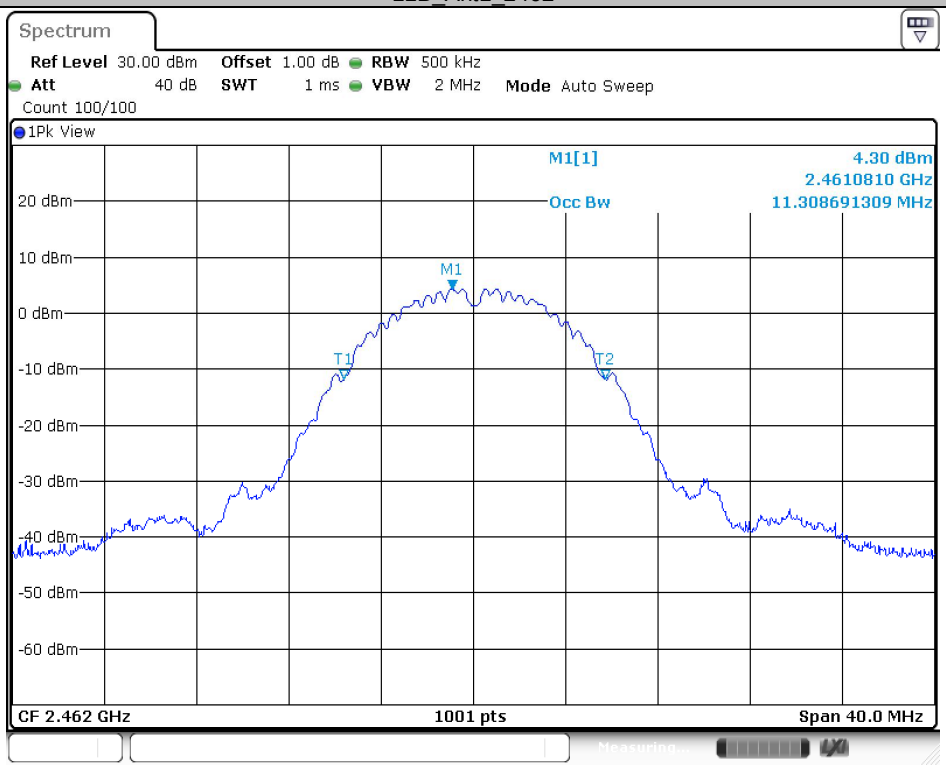


Date: 14.OCT.2023 16:58:24

11B_Ant1_2462



Date: 14.OCT.2023 17:00:46

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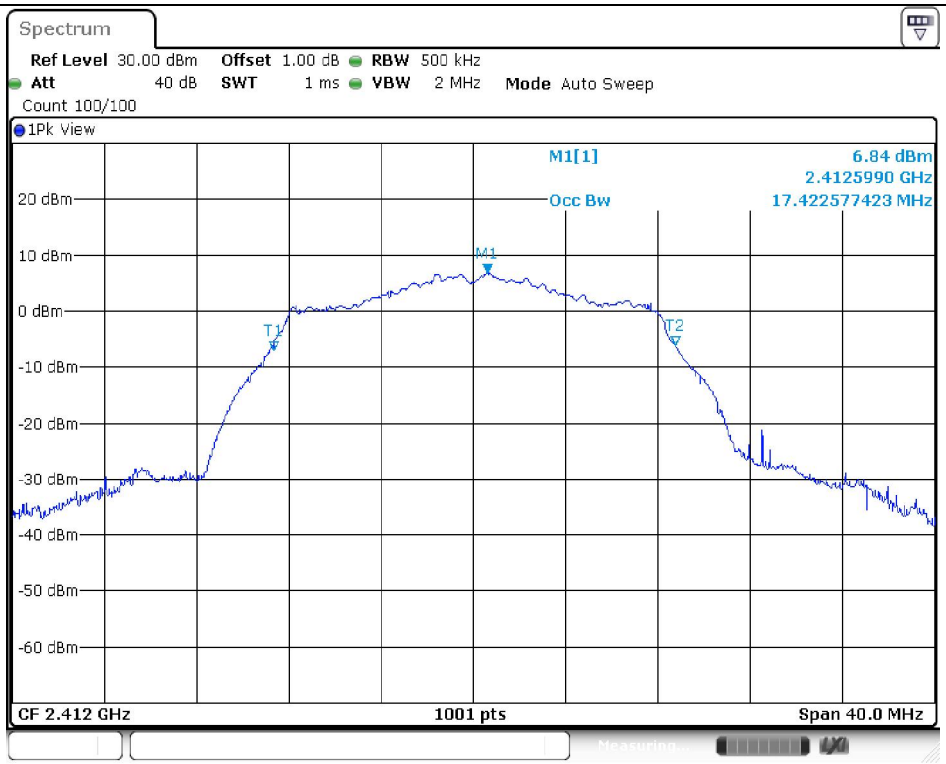

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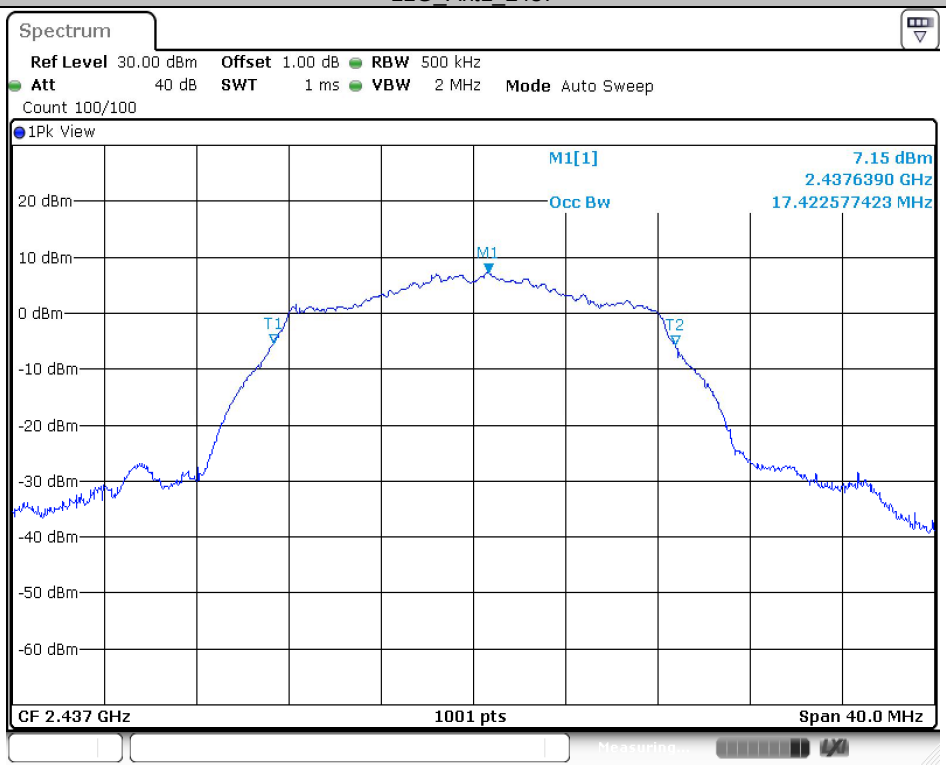

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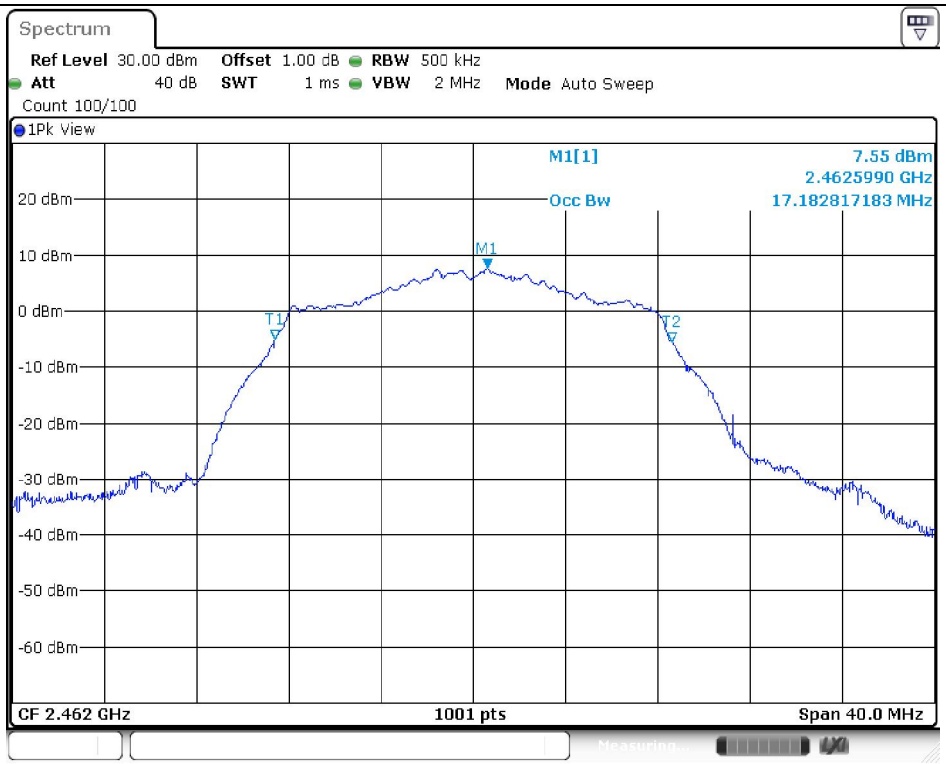

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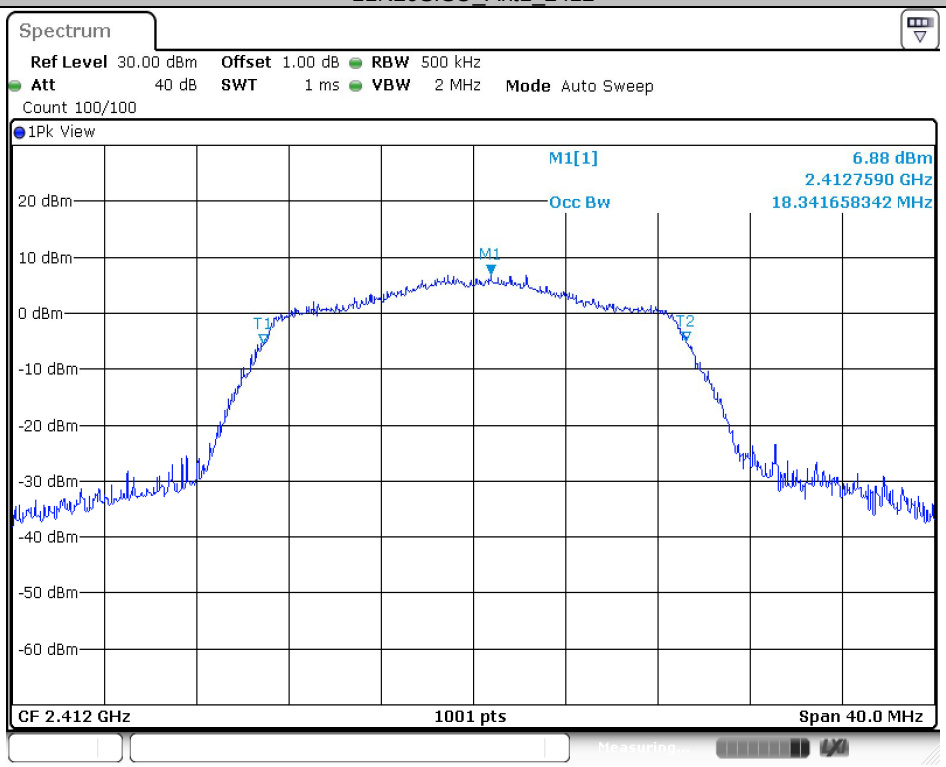

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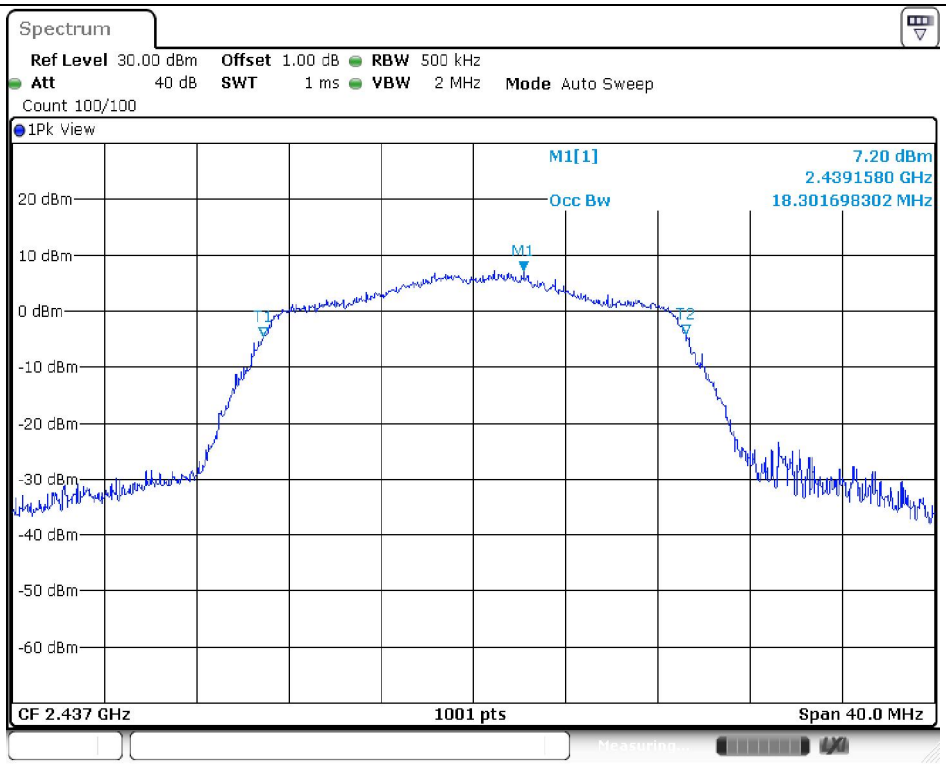

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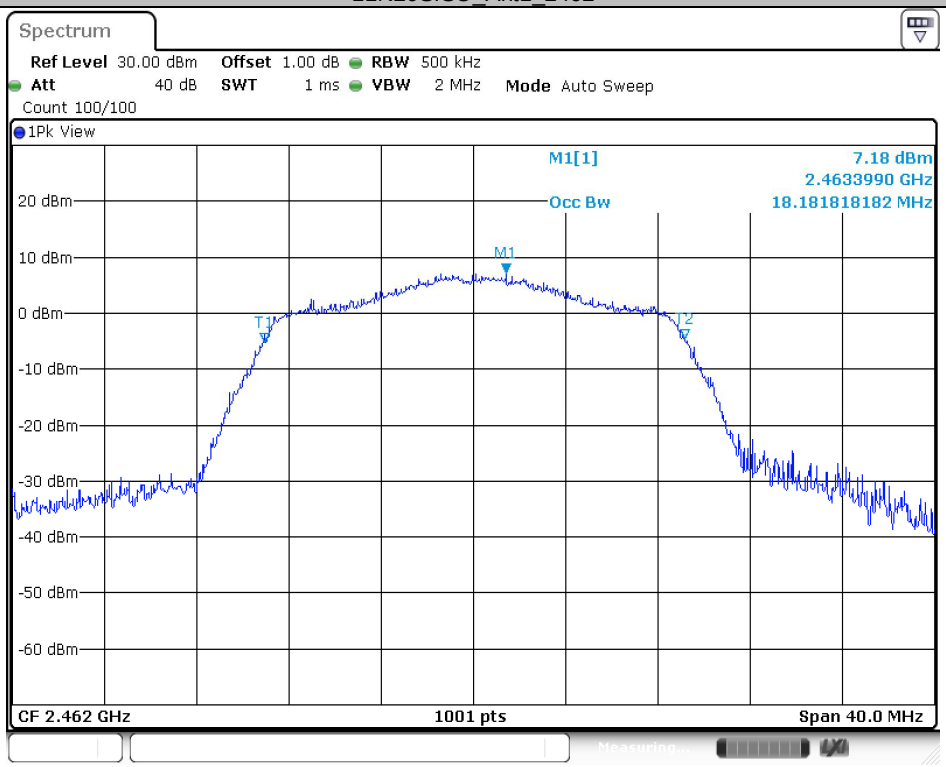

Date: 14.OCT.2023 17:12:46

9.5 Power Spectral Density

Test Method

1. The RF output of EUT was connected to the spectrum analyzer. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
4. Set analyzer center frequency to DTS channel center frequency. RBW=3kHz, VBW≥3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
5. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
6. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm/3KHz]

≤8

TestMode	Antenna	Channel[MHz]	Result[dBm/3KHz]	Limit[dBm/3KHz]	Verdict
11B	Ant1	2412	-8.92	<=8	PASS
		2437	-9.48	<=8	PASS
		2462	-8.49	<=8	PASS
11G	Ant1	2412	-11.42	<=8	PASS
		2437	-11.05	<=8	PASS
		2462	-10.84	<=8	PASS
11N20SISO	Ant1	2412	-12.39	<=8	PASS
		2437	-12.03	<=8	PASS
		2462	-11.63	<=8	PASS

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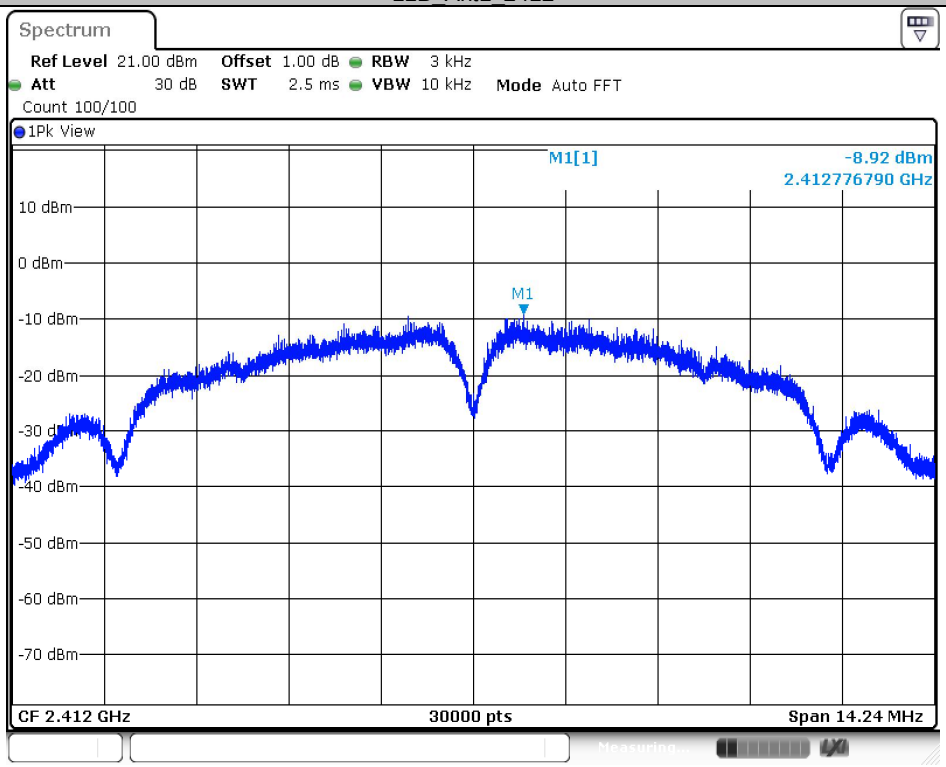
11B_Ant1_2412



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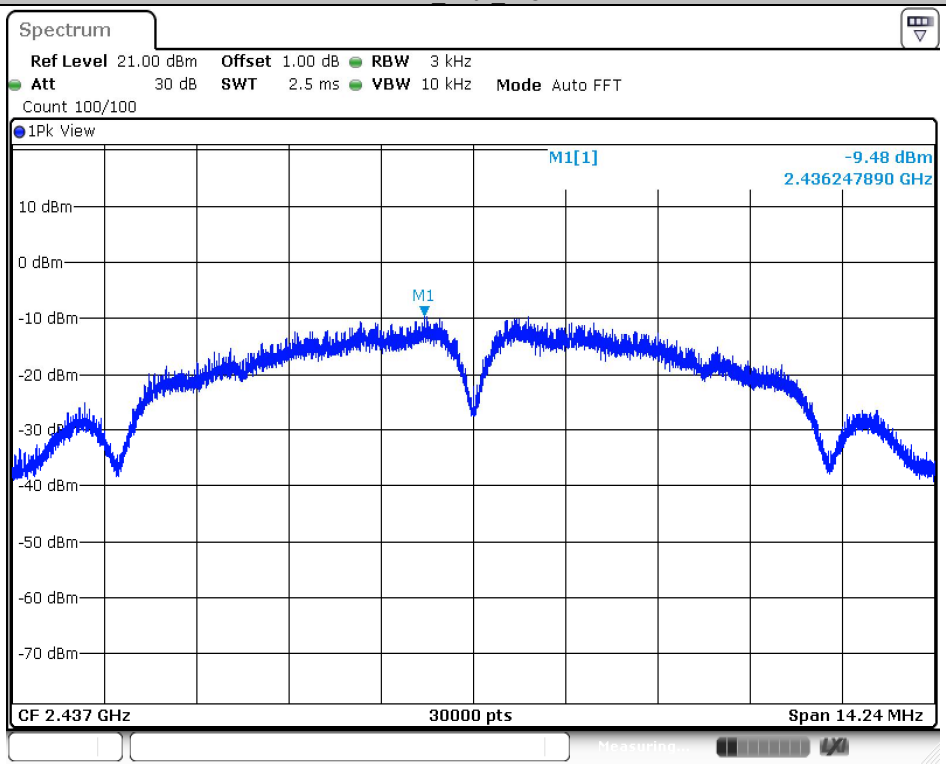

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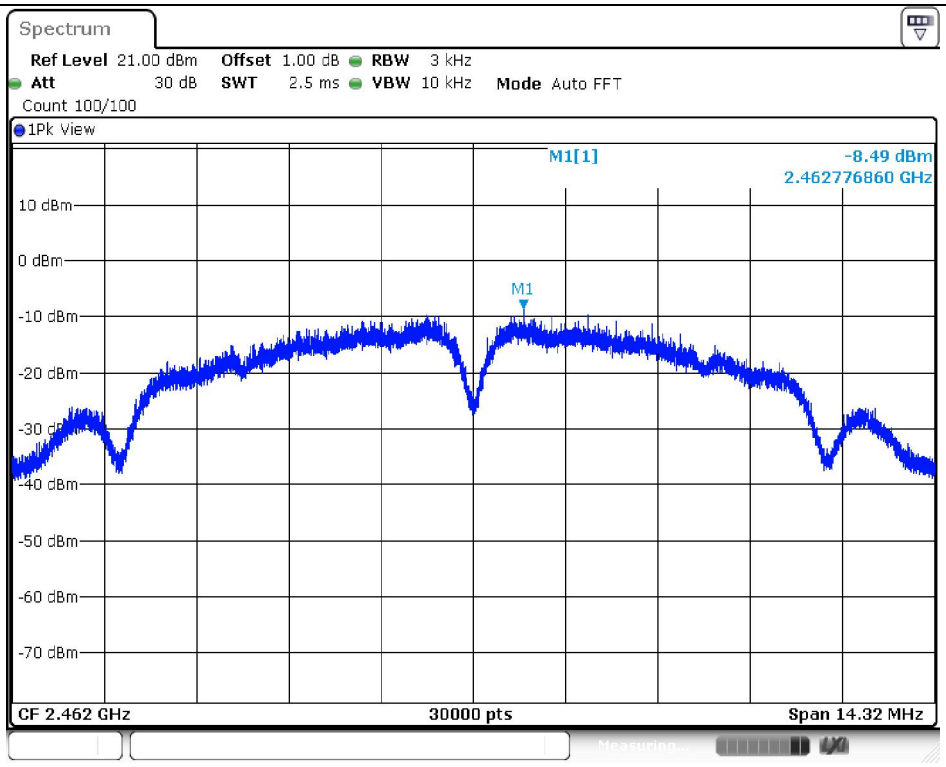

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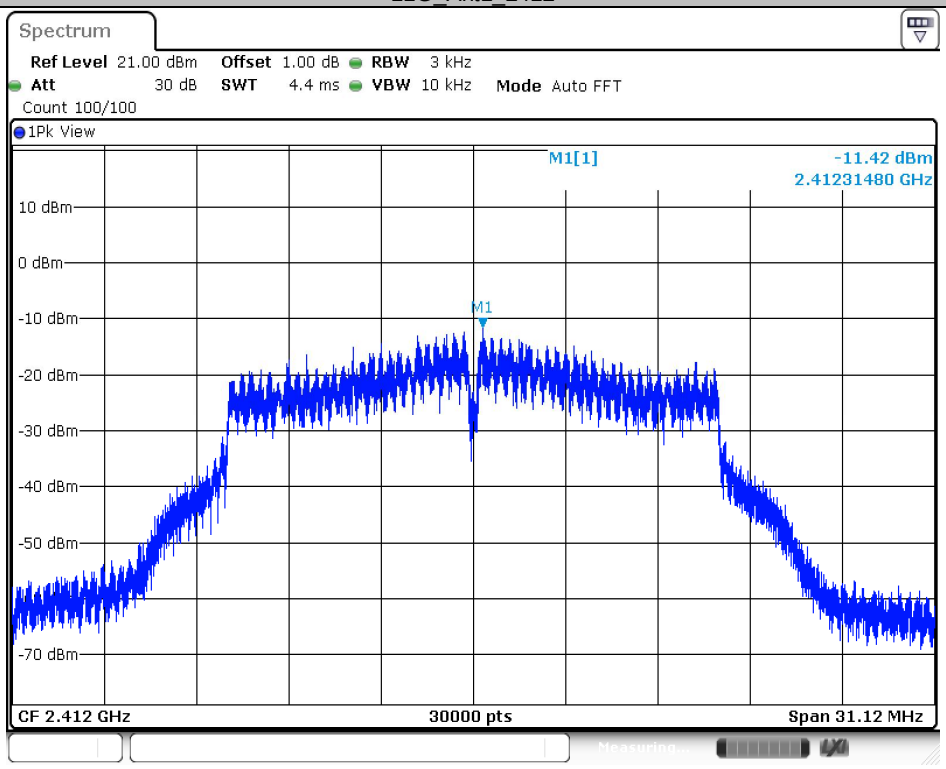

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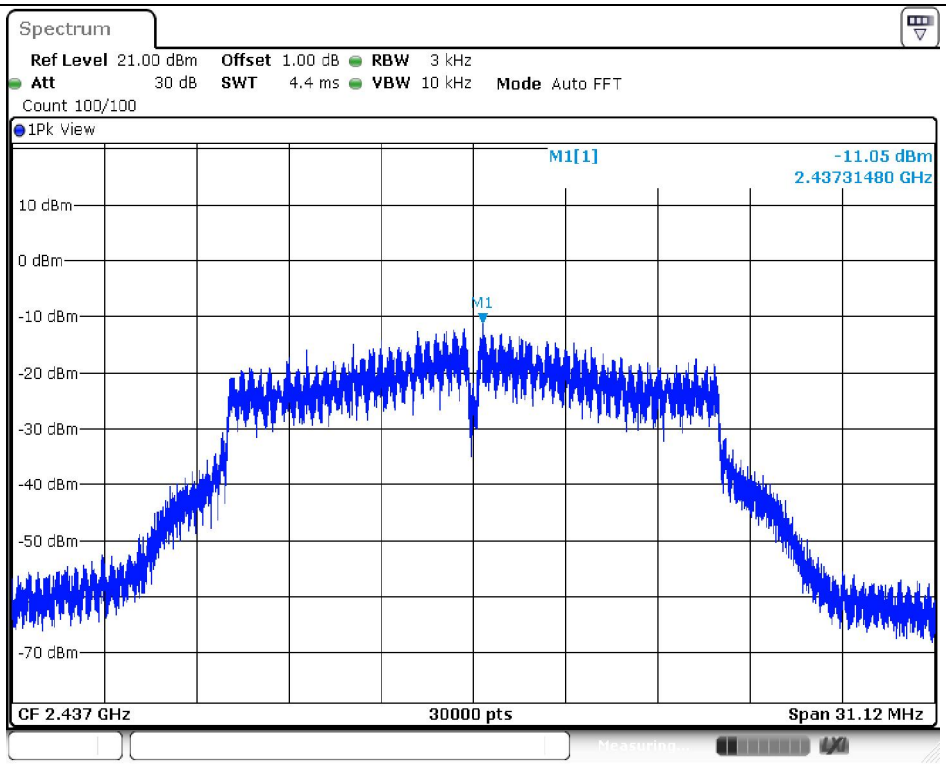

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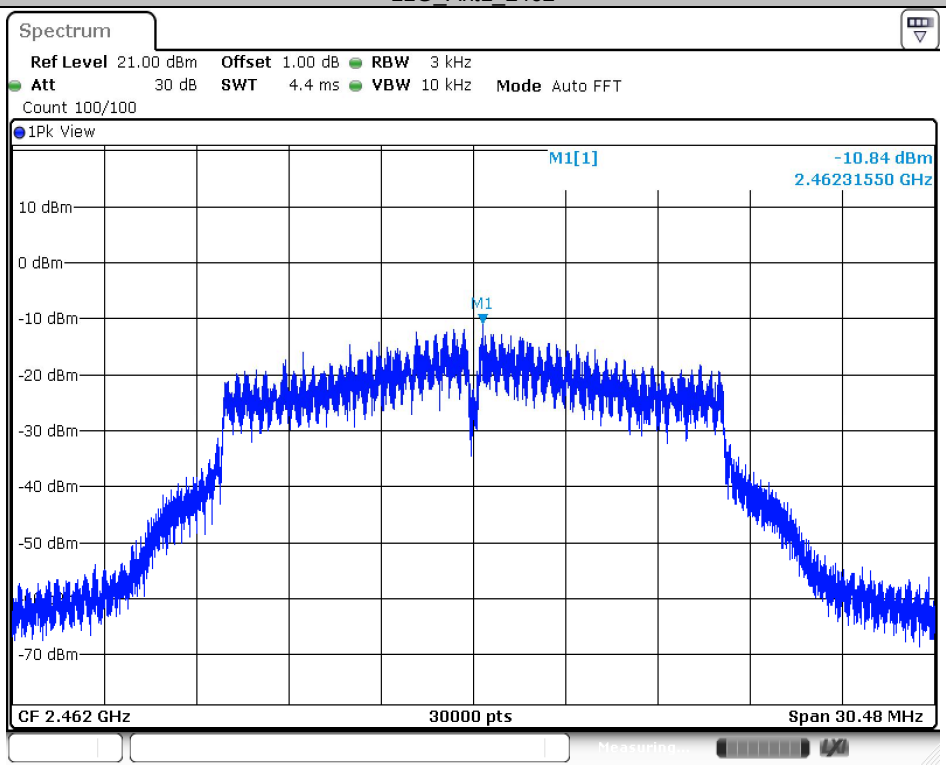

11N20SISO_Ant1_2412

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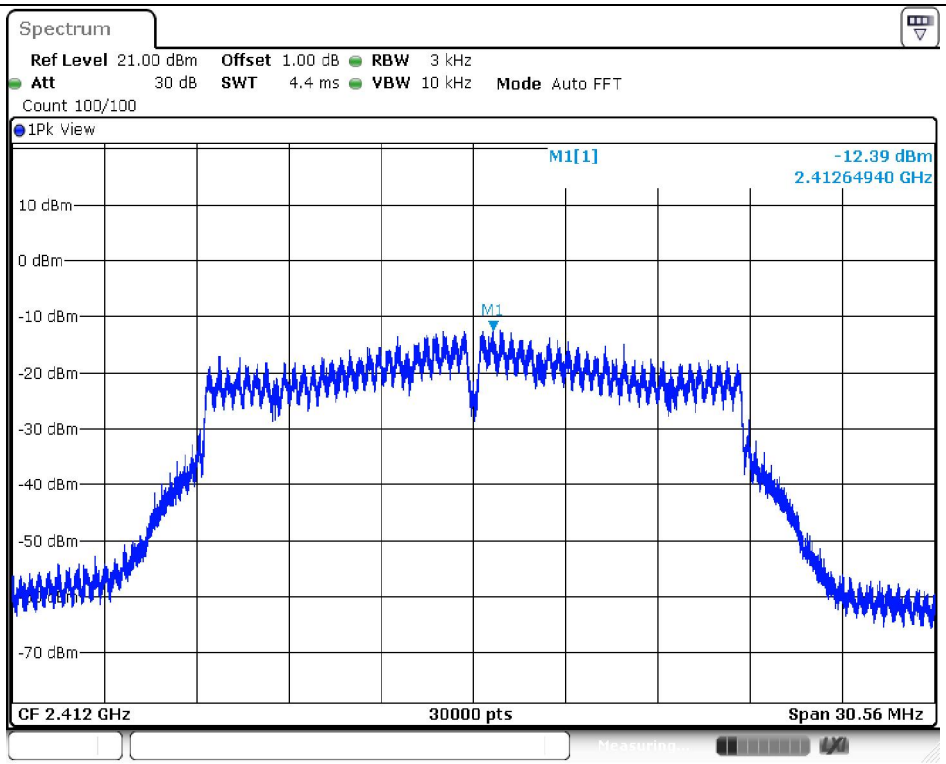

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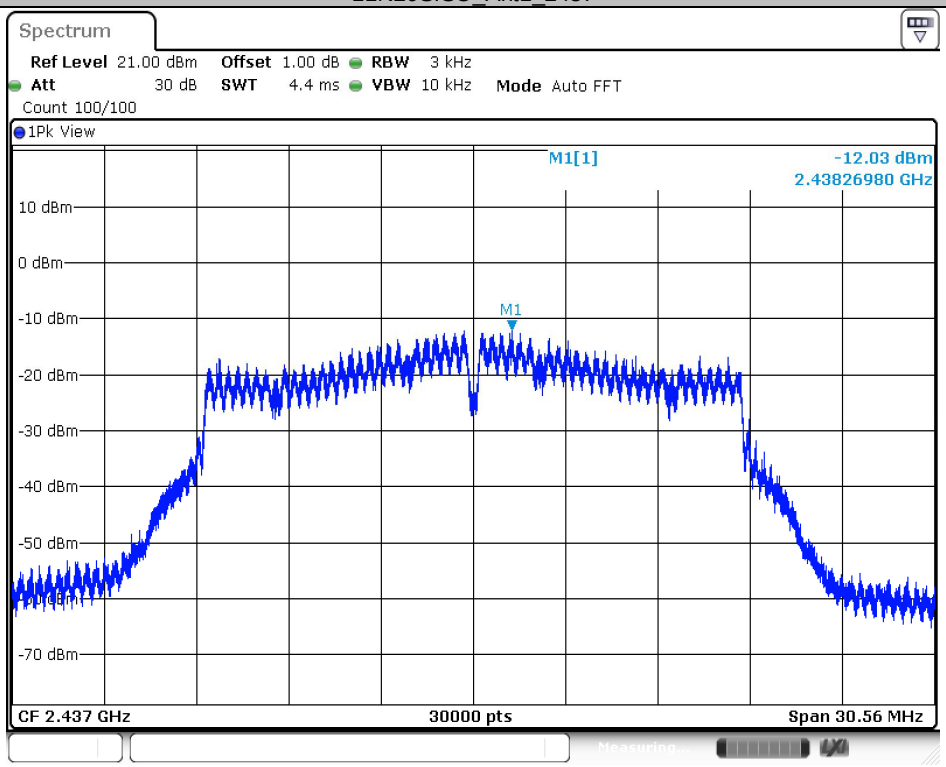

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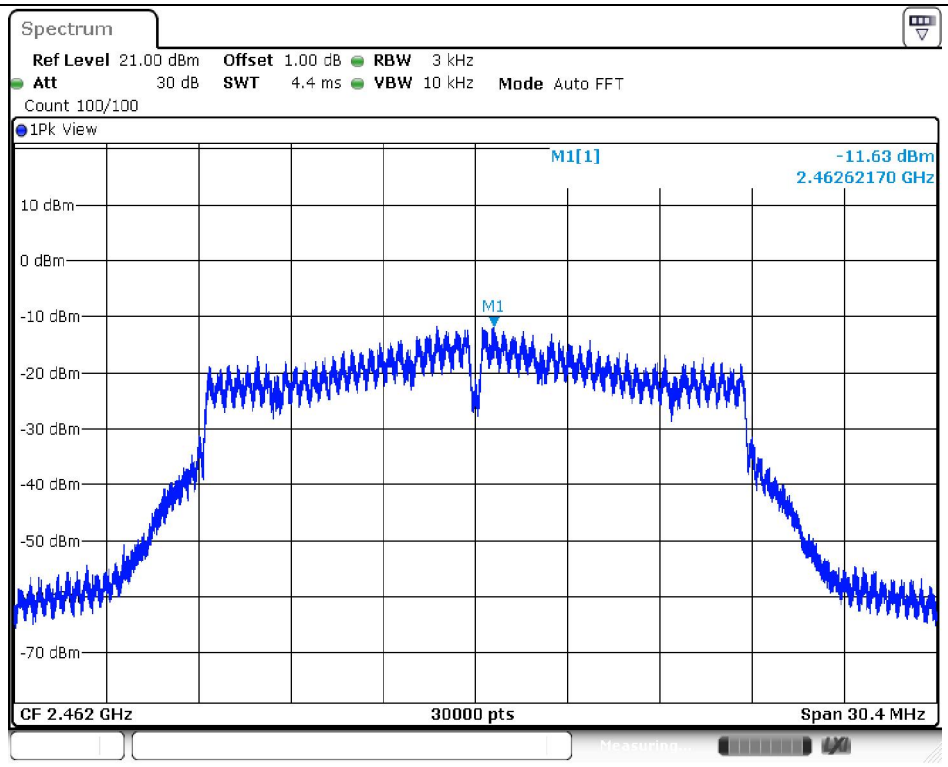

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9.6 Spurious RF Conducted Emissions

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.
   RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.
5. The level displayed must comply with the limit specified in this Section. Submit these plots.
6. Repeat above procedures until all frequencies measured were complete.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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Spurious RF conducted emissions

TestMode	Antenna	Channel (MHz)	Frequency Range (MHz)	Reference Level	Result (MHz)	Limit(dBm)	Verdict
11B	Ant1	2412	Reference	4.11	4.11	---	PASS
			30~1000	30~1000	-68.65	<=-15.89	PASS
			1000~26500	1000~26500	-41.54	<=-15.89	PASS
		2437	Reference	3.55	3.55	---	PASS
			30~1000	30~1000	-68.53	<=-16.45	PASS
			1000~26500	1000~26500	-52.63	<=-16.45	PASS
		2462	Reference	3.73	3.73	---	PASS
			30~1000	30~1000	-67.92	<=-16.27	PASS
			1000~26500	1000~26500	-50.69	<=-16.27	PASS
11G	Ant1	2412	Reference	-0.46	-0.46	---	PASS
			30~1000	30~1000	-67.9	<=-20.46	PASS
			1000~26500	1000~26500	-39.63	<=-20.46	PASS
		2437	Reference	-0.06	-0.06	---	PASS
			30~1000	30~1000	-67.95	<=-20.06	PASS
			1000~26500	1000~26500	-52.35	<=-20.06	PASS
		2462	Reference	0.21	0.21	---	PASS
			30~1000	30~1000	-67.69	<=-19.79	PASS
			1000~26500	1000~26500	-52.27	<=-19.79	PASS
11N20SISO	Ant1	2412	Reference	-0.51	-0.51	---	PASS
			30~1000	30~1000	-68.2	<=-20.51	PASS
			1000~26500	1000~26500	-36.88	<=-20.51	PASS
		2437	Reference	-0.18	-0.18	---	PASS
			30~1000	30~1000	-67.4	<=-20.18	PASS
			1000~26500	1000~26500	-52.16	<=-20.18	PASS
		2462	Reference	-0.26	-0.26	---	PASS
			30~1000	30~1000	-68.11	<=-20.26	PASS
			1000~26500	1000~26500	-52.49	<=-20.26	PASS

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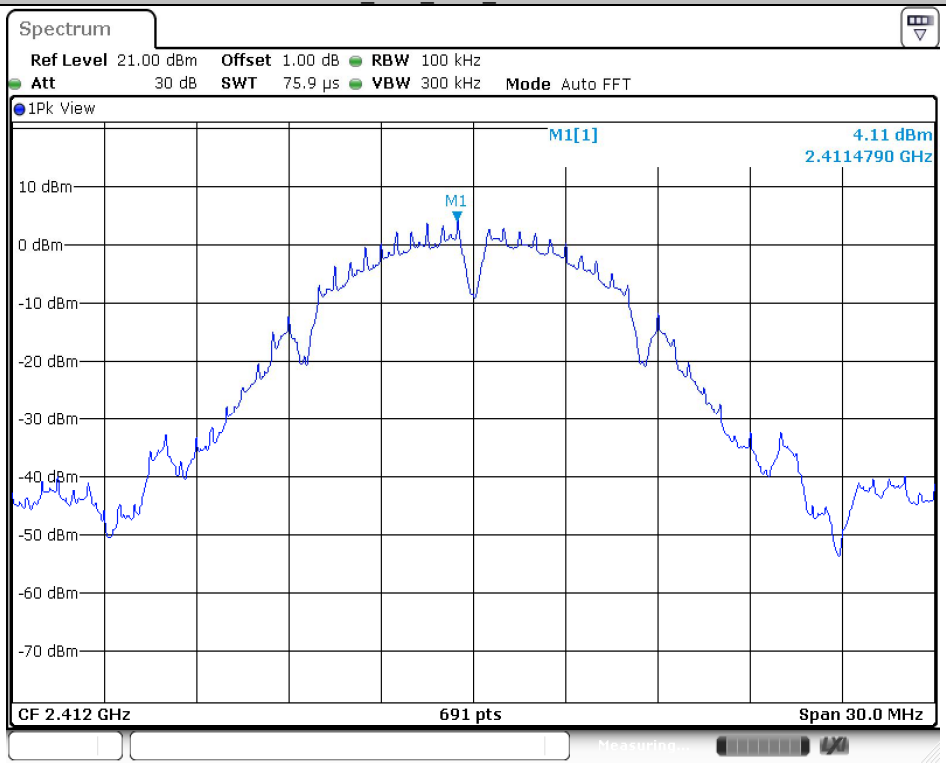

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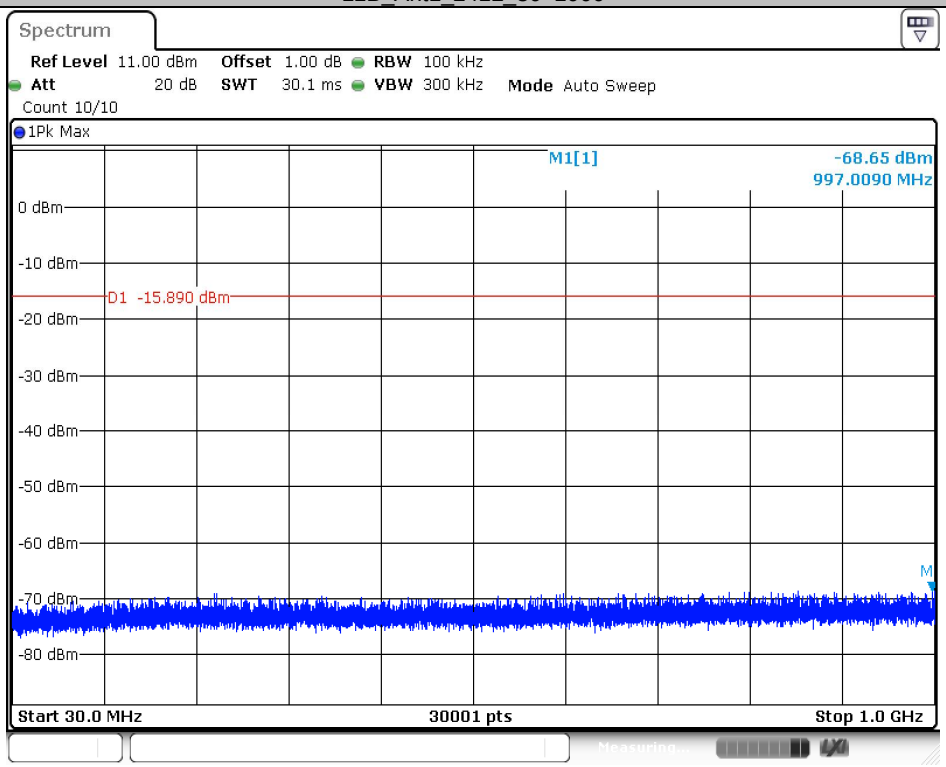
11B_Ant1_2412_30~1000



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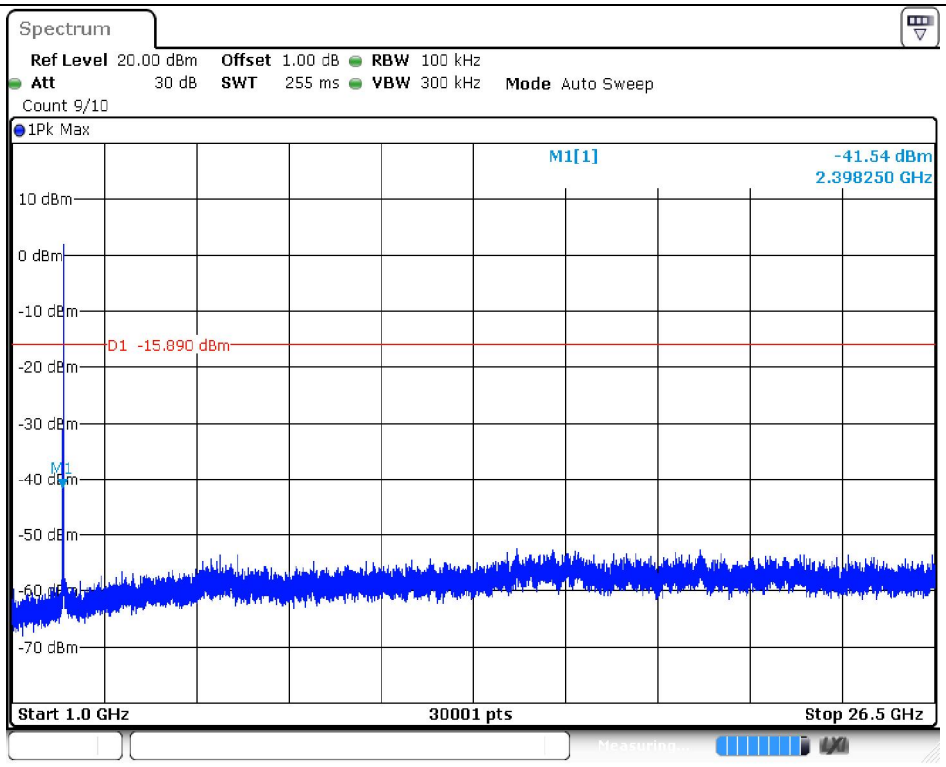
11B_Ant1_2412_1000~26500



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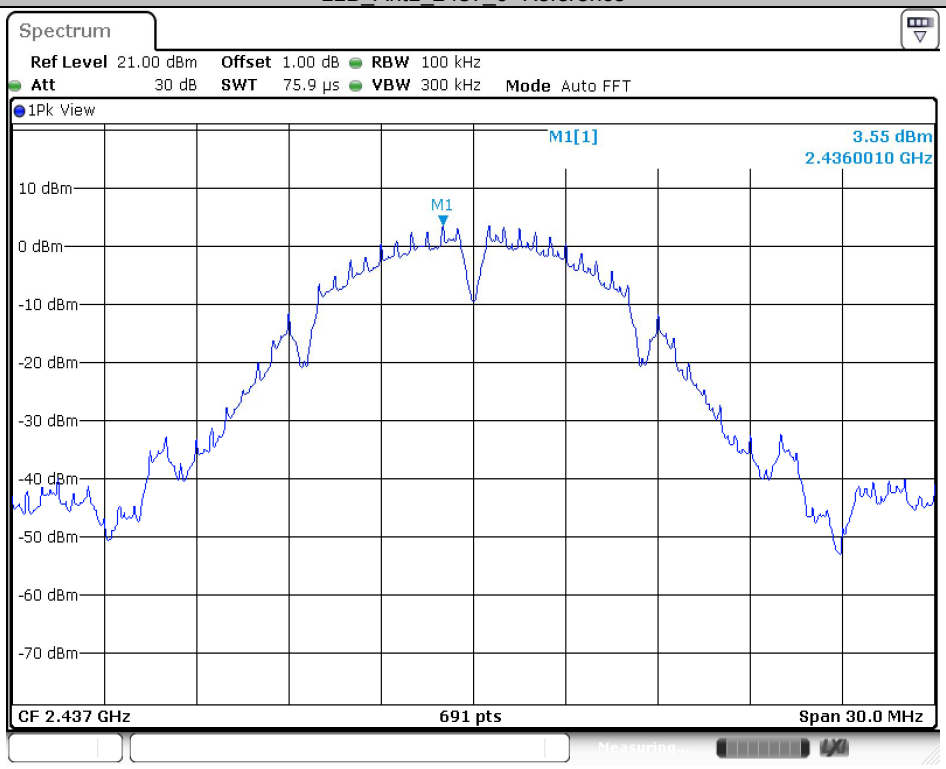

11B_Ant1_2437_30~1000

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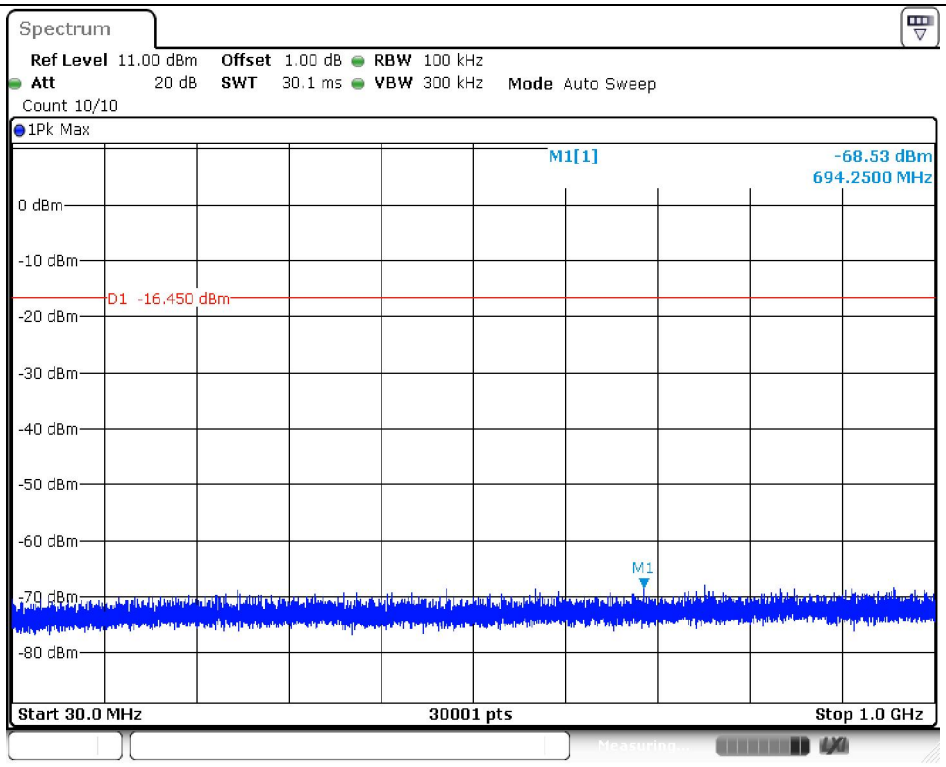

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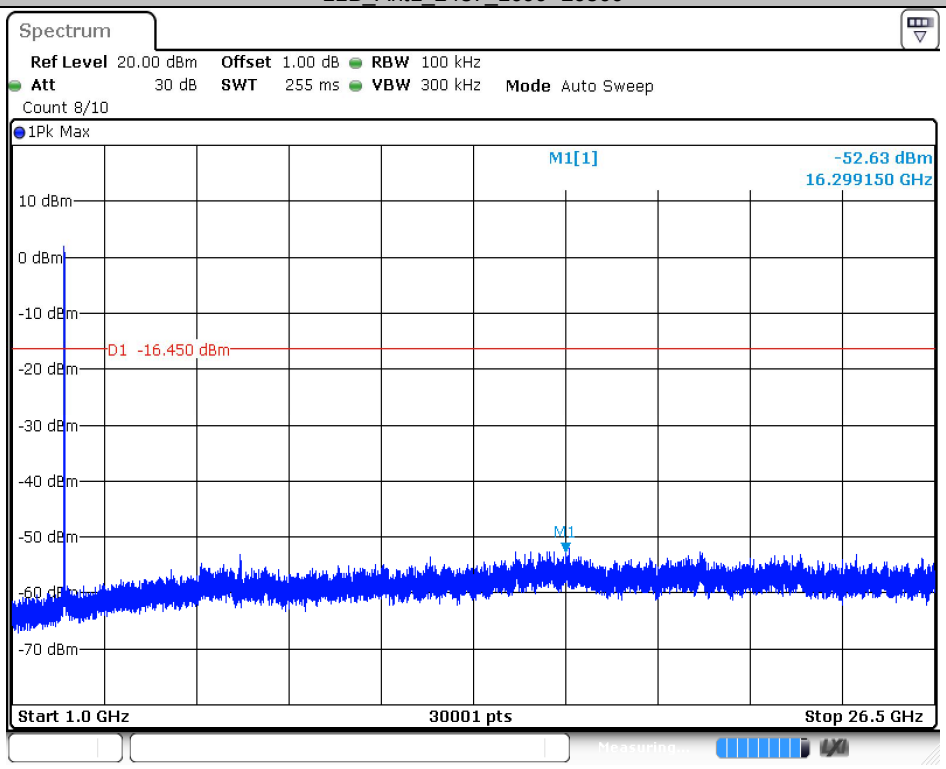

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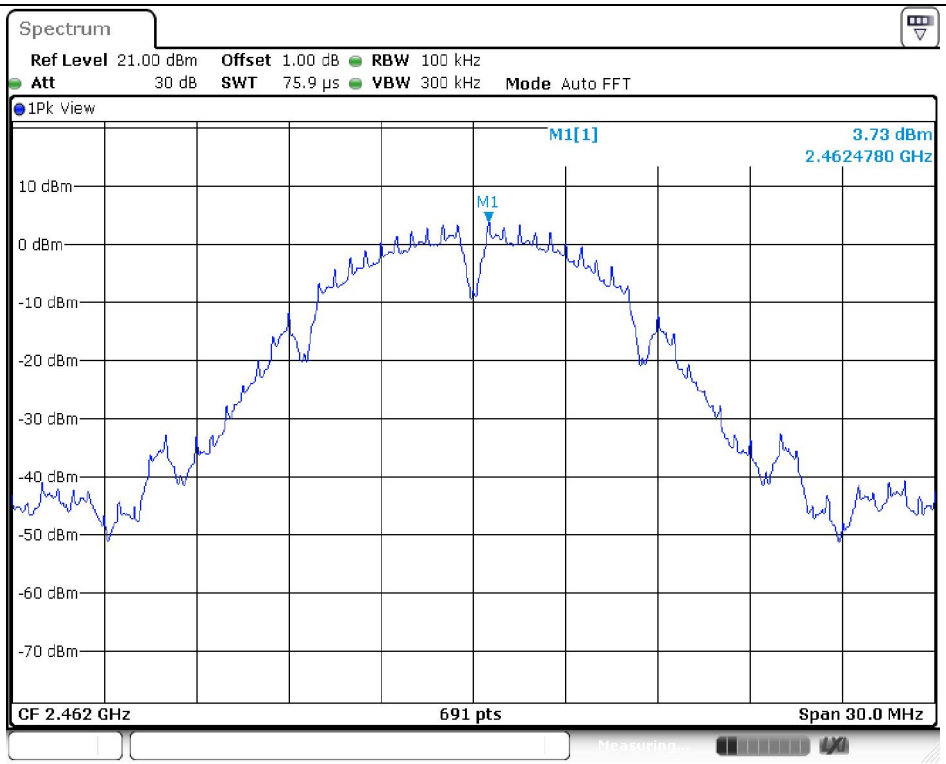

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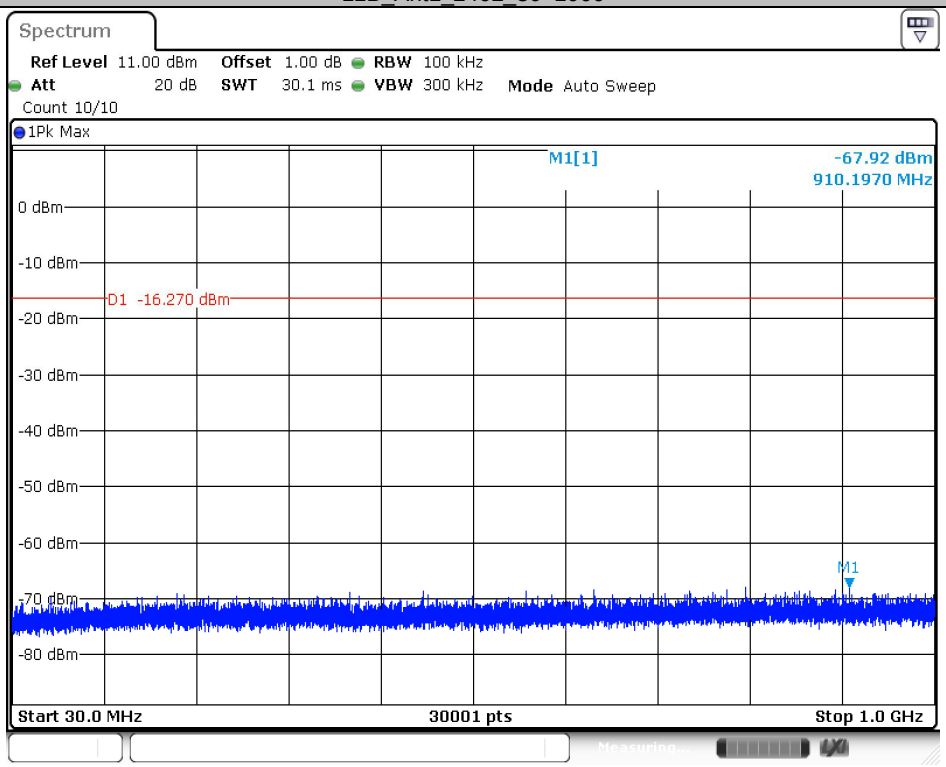

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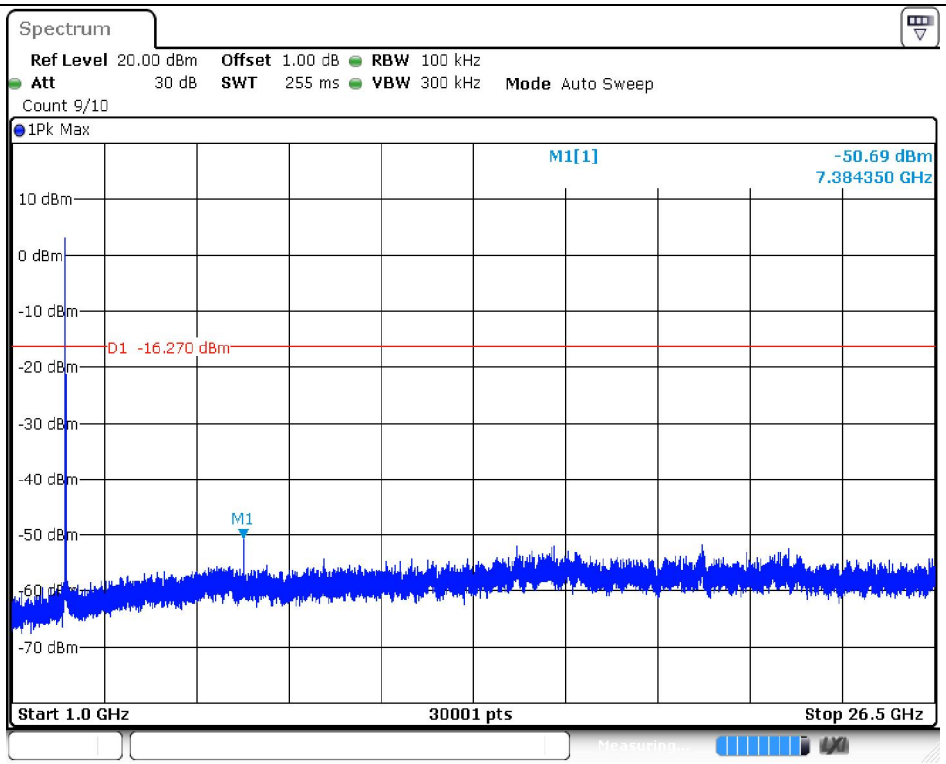

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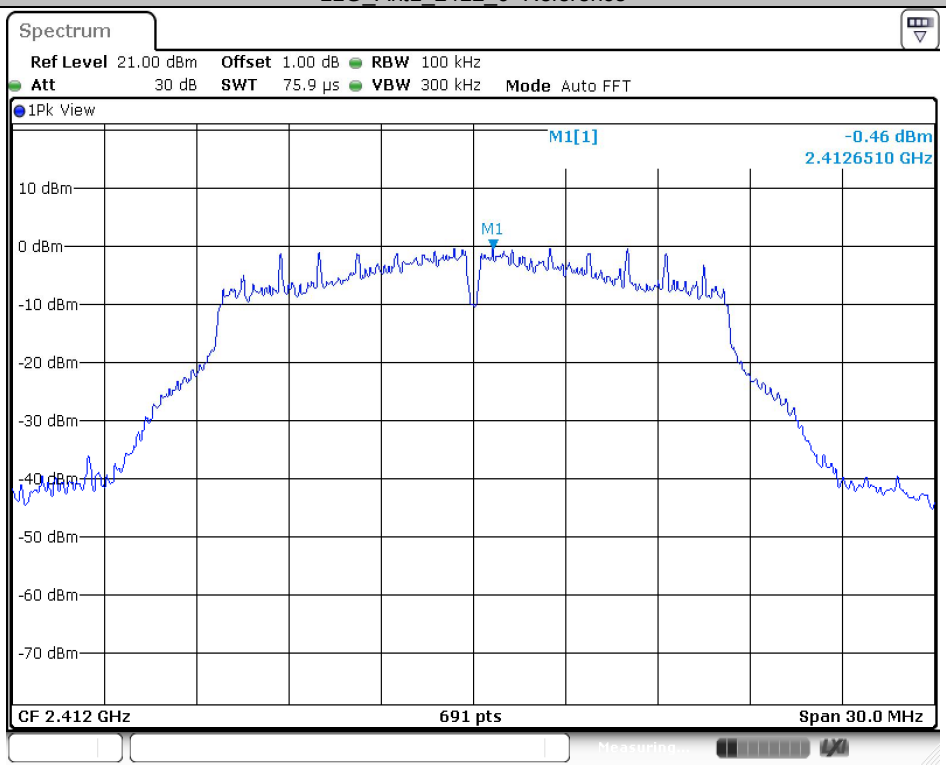

11G_Ant1_2412_30~1000

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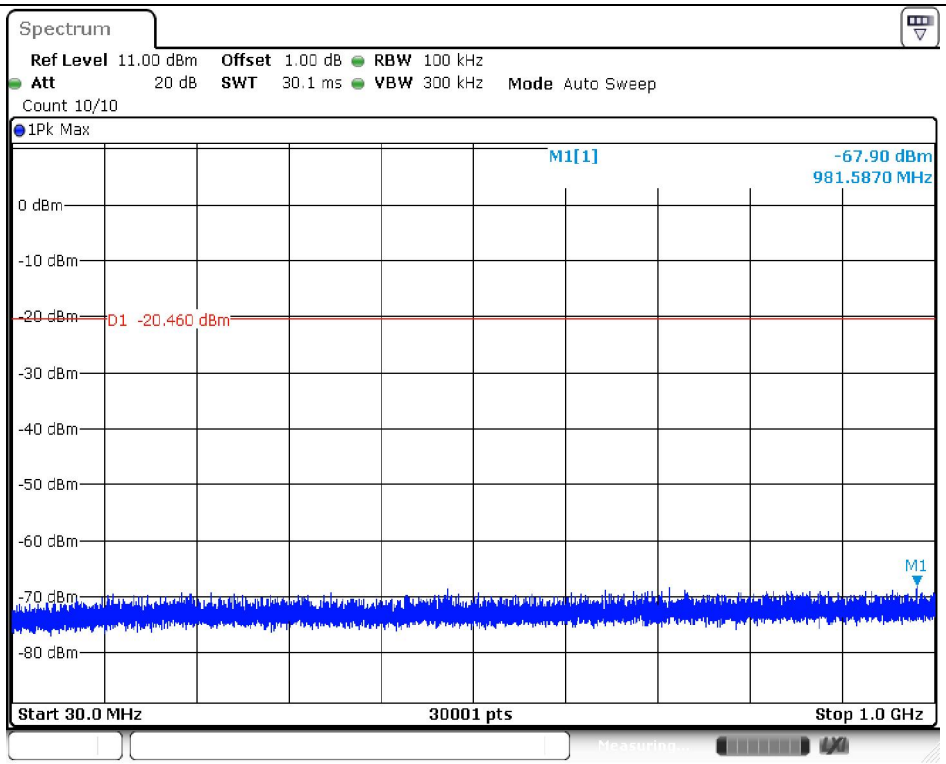

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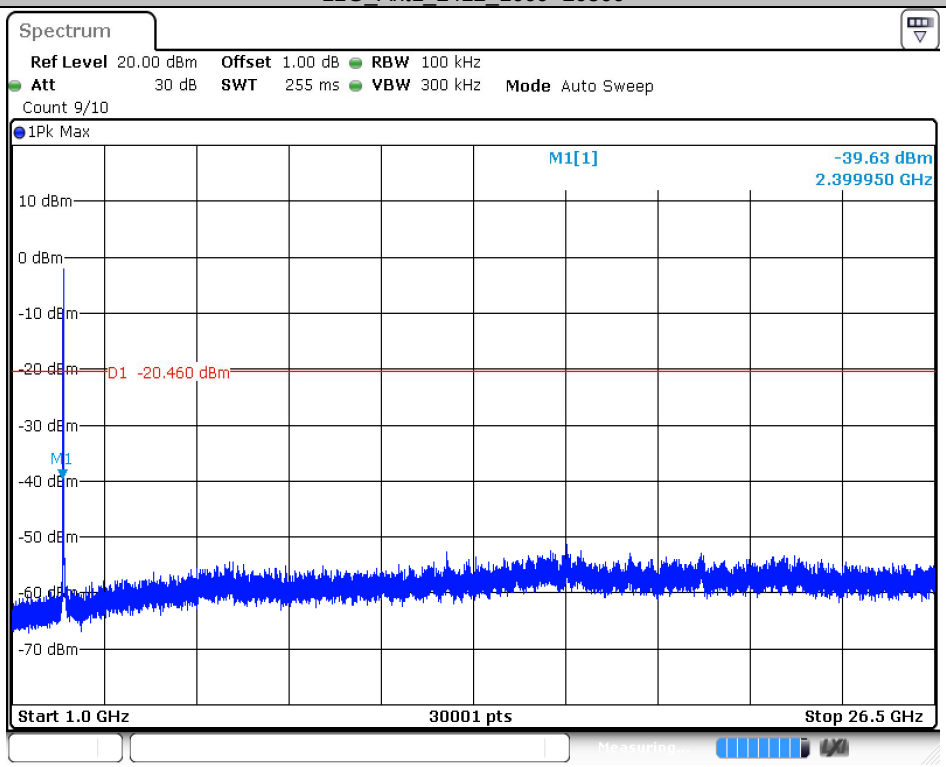

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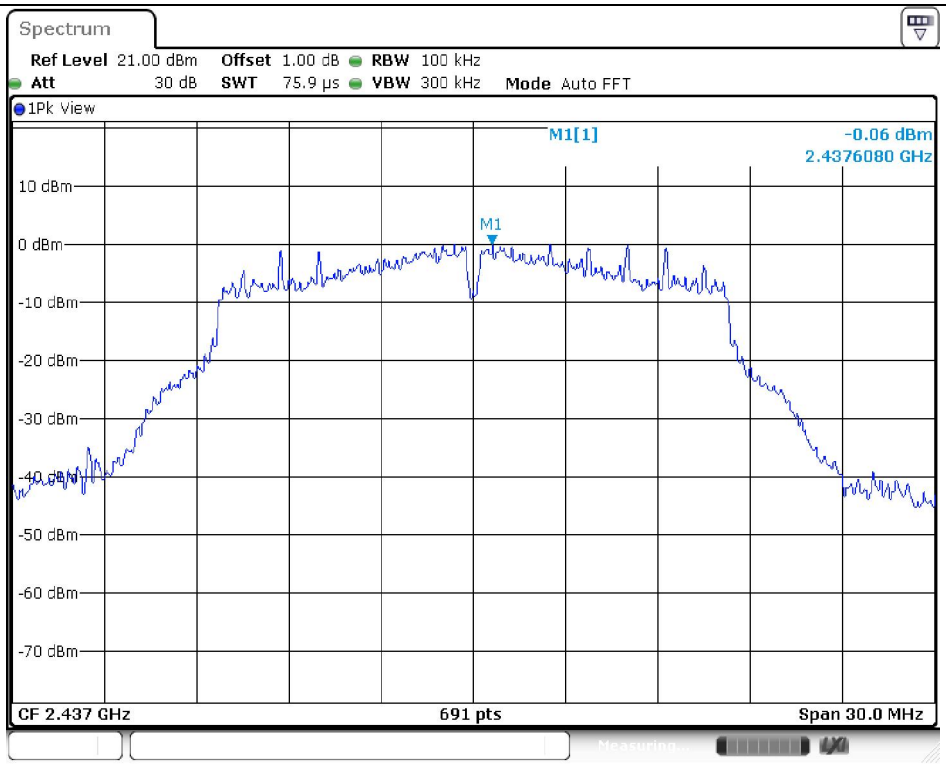

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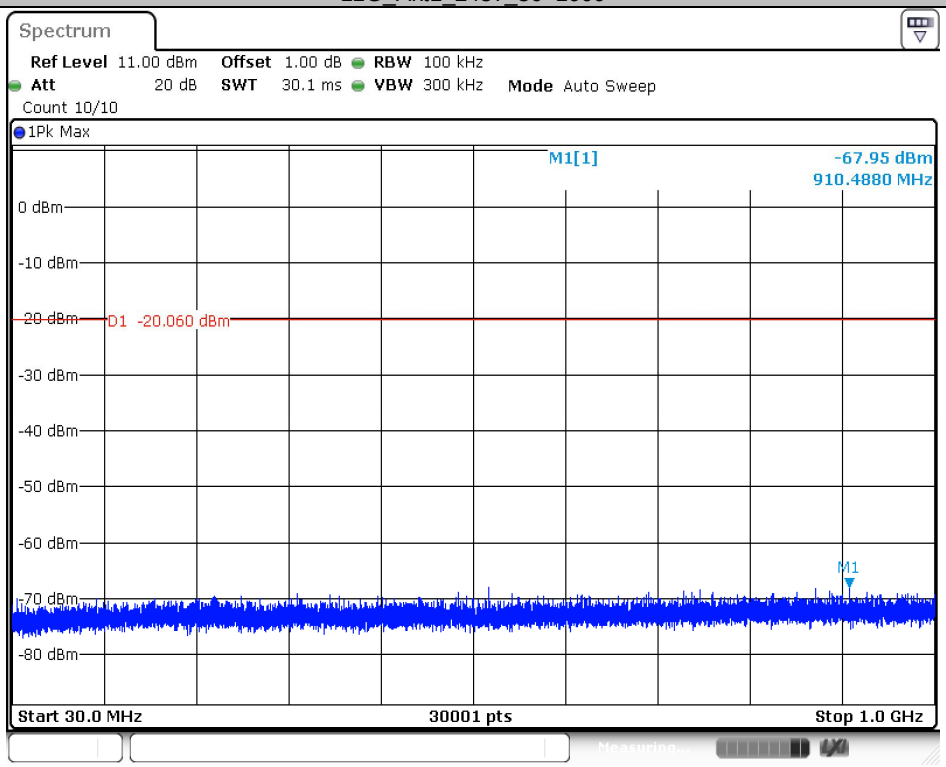

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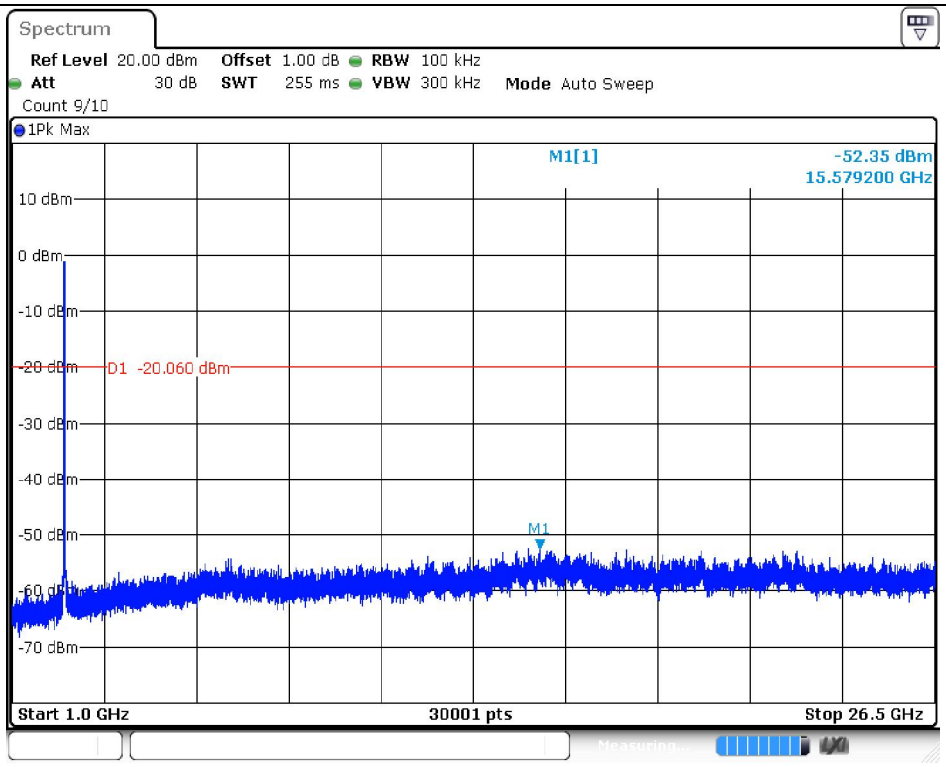

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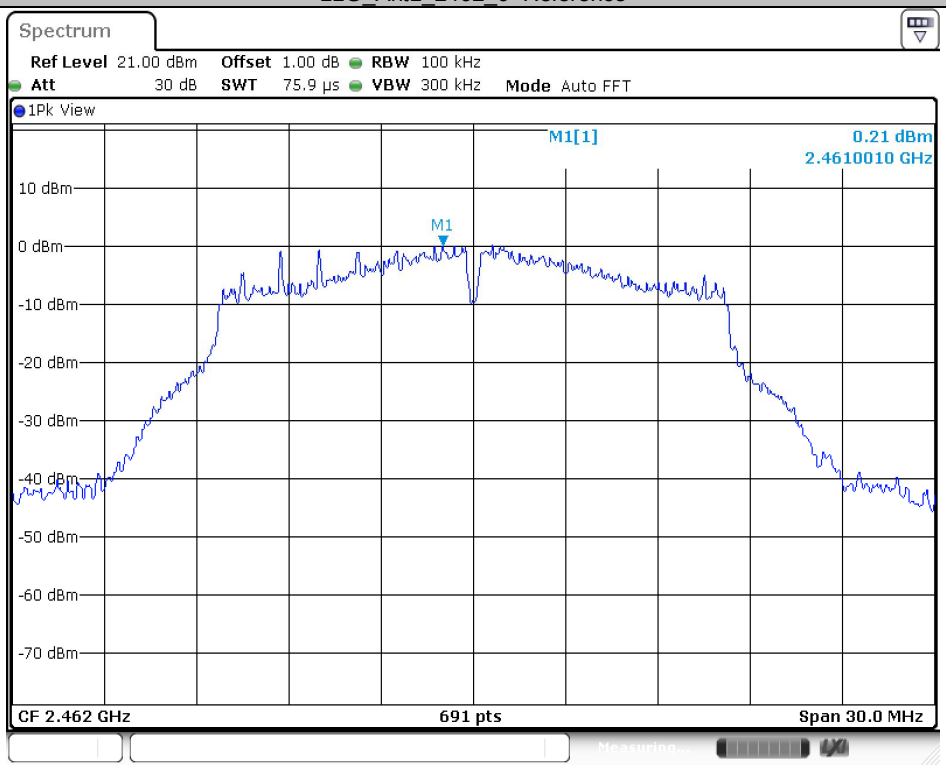

11G_Ant1_2462_30~1000

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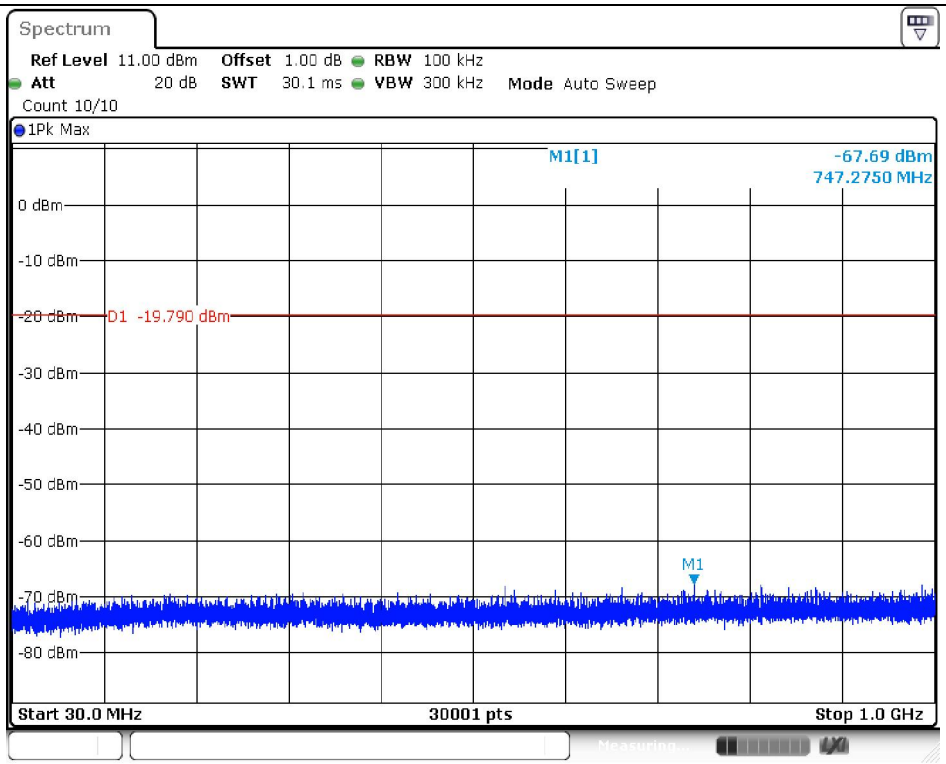

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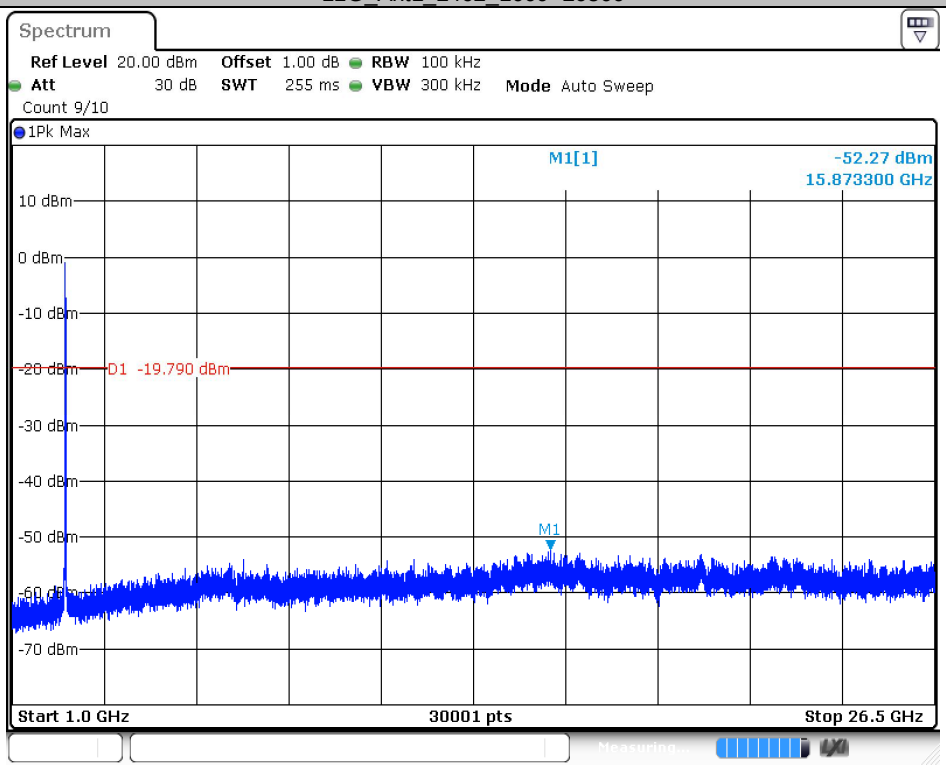

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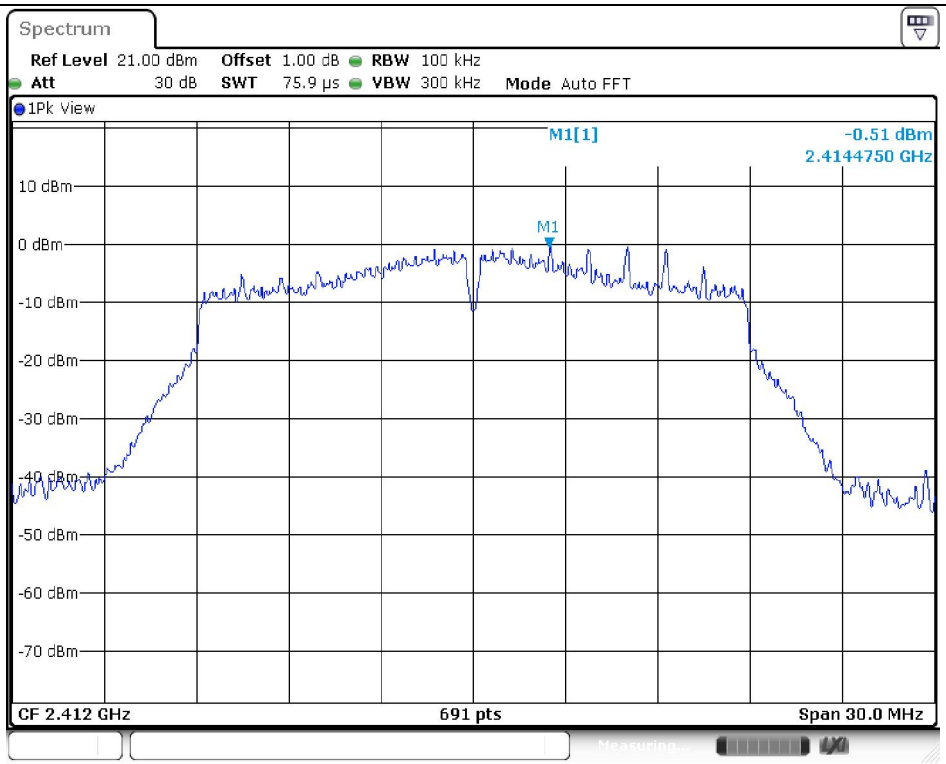

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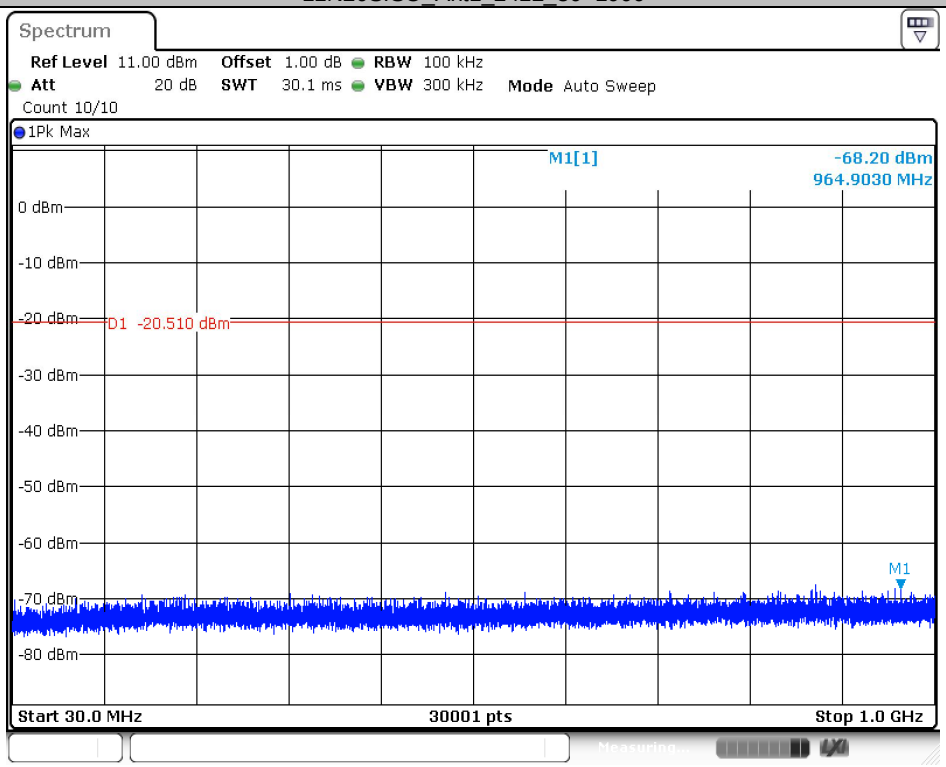

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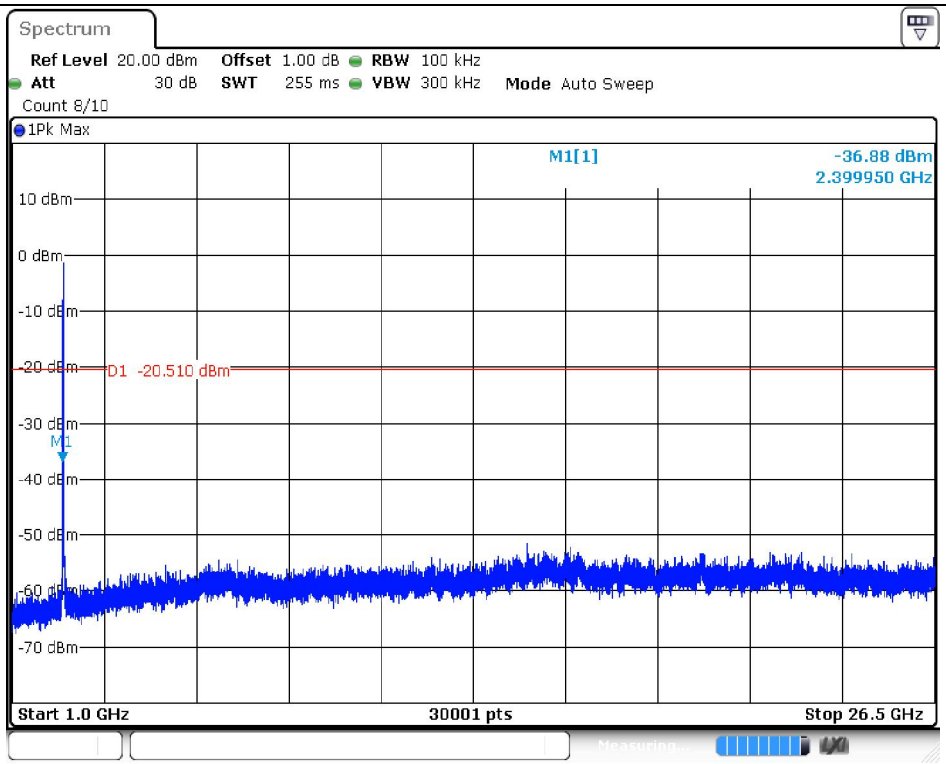
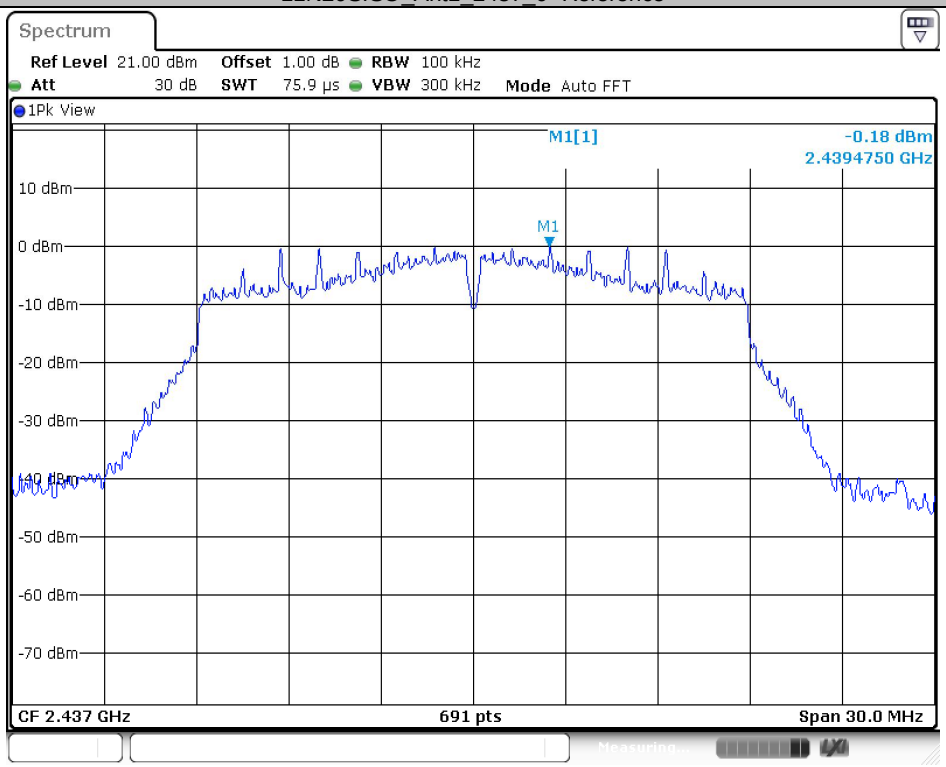


Date: 14.OCT.2023 17:09:40

11N20SISO_Ant1_2437_0~Reference



Date: 14.OCT.2023 17:10:57

11N20SISO_Ant1_2437_30~1000

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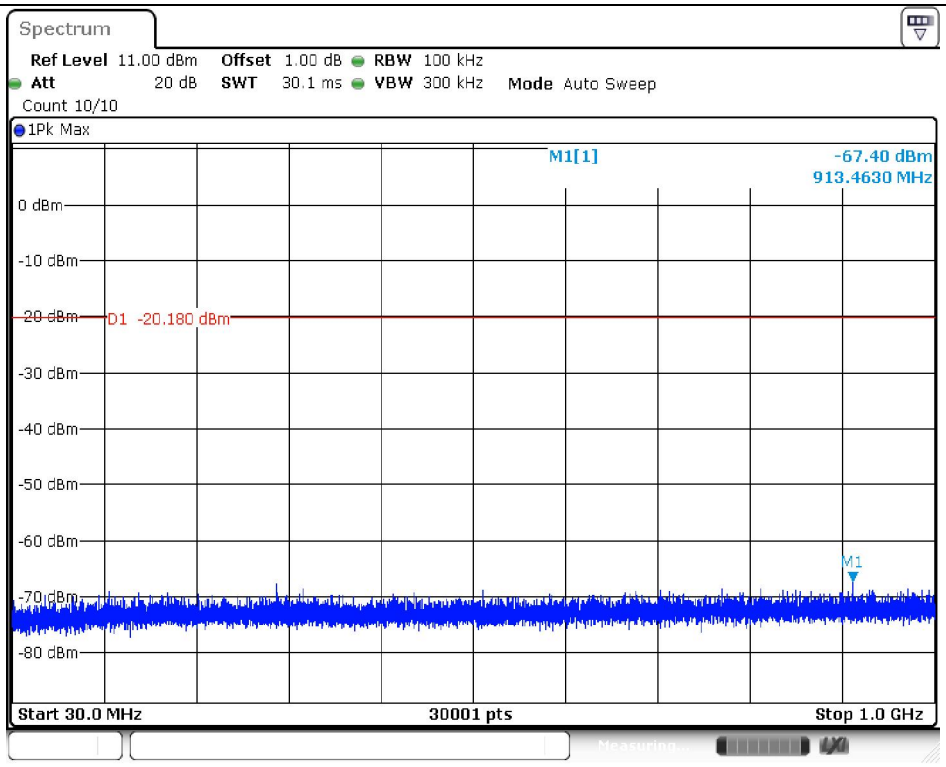
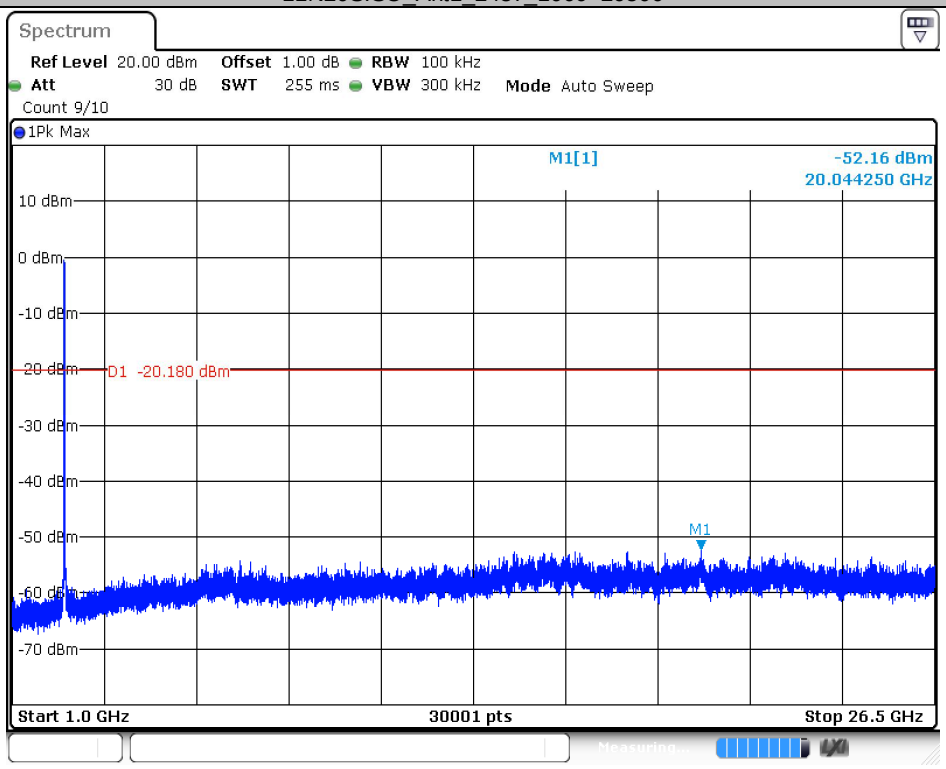


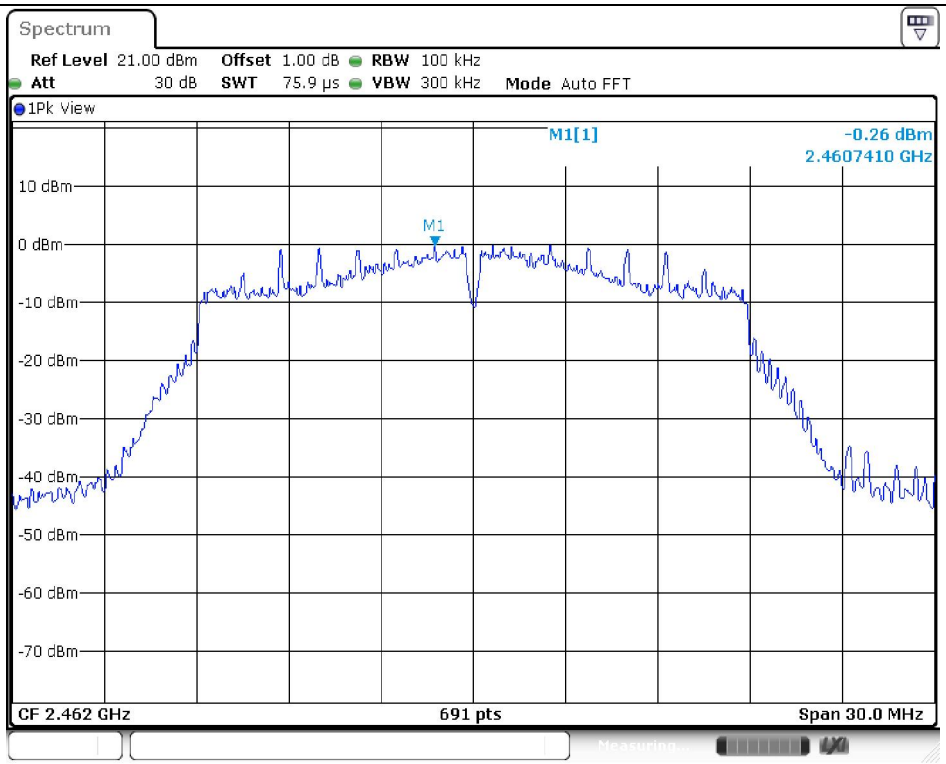
Date: 14.OCT.2023 17:11:03

11N20SISO_Ant1_2437_1000~26500

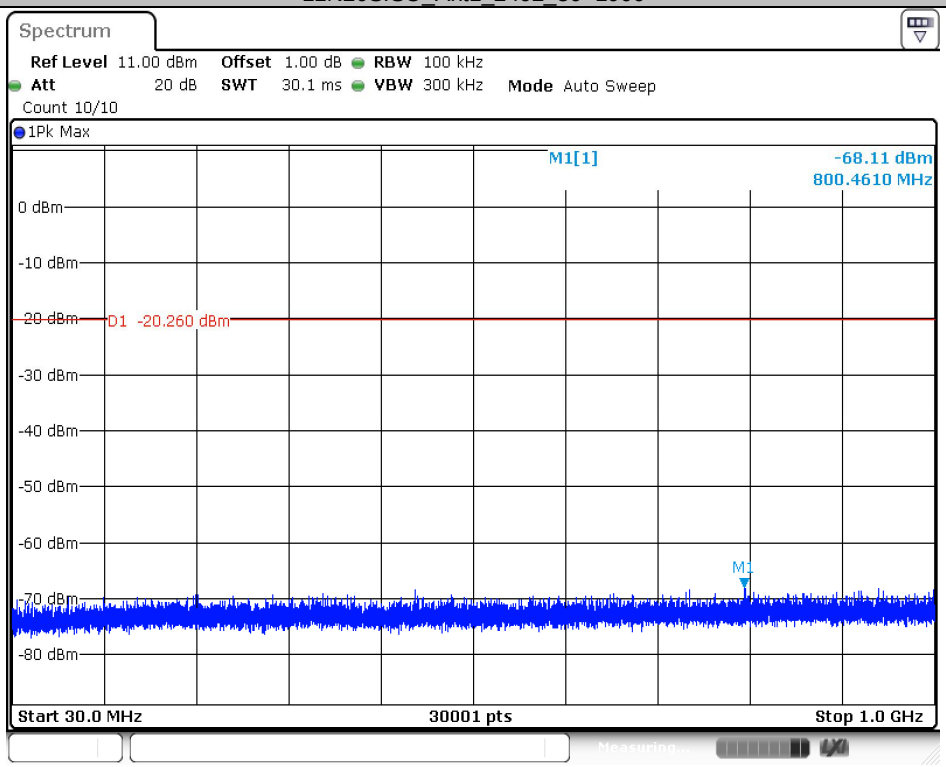


Date: 14.OCT.2023 17:11:11

11N20SISO_Ant1_2462_0~Reference



11N20SISO_Ant1_2462_30~1000



11N20SISO_Ant1_2462_1000~26500

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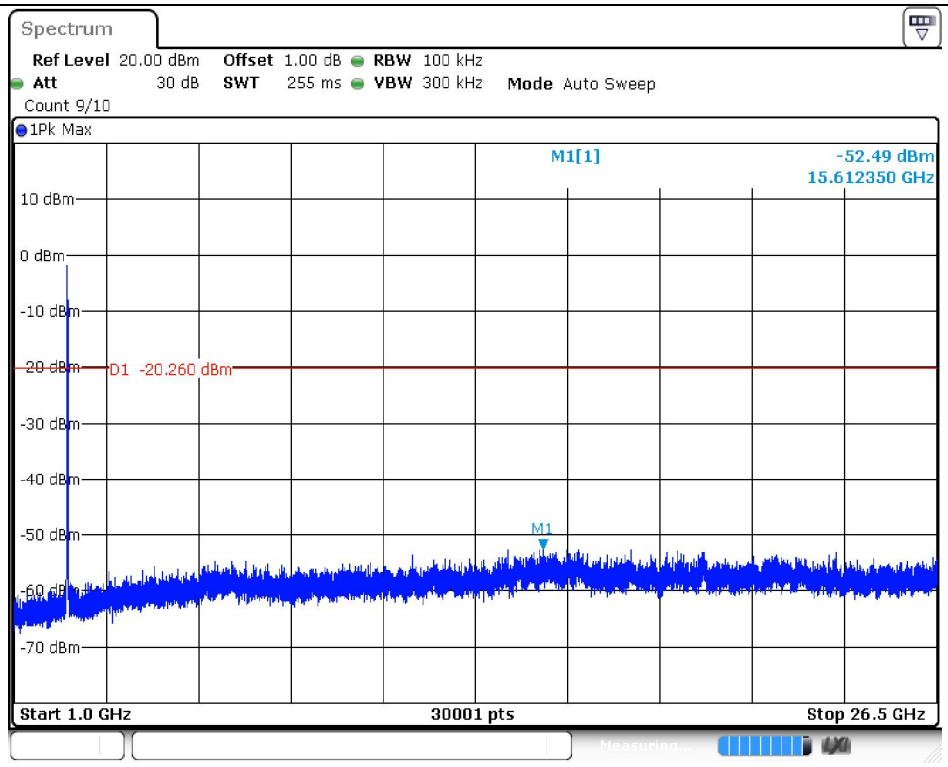
Spectrum
Ref Level 20.00 dBm Offset 1.00 dB RBW 100 kHz
Att 30 dB SWT 255 ms VBW 300 kHz Mode Auto Sweep
Count 9/10
1Pk Max
M1[1] -52.49 dBm
15.612350 GHz
10 dBm
0 dBm
-10 dBm
-20 dBm
D1 -20.260 dBm
-30 dBm
-40 dBm
-50 dBm
M1
-60 dBm
-70 dBm
Start 1.0 GHz
30001 pts
Stop 26.5 GHz
Measuring...
Date: 14.OCT.2023 17:13:20

9.7 Band Edge Testing

Test Method

1. The RF output of EUT was connected to the spectrum analyzer by RF cable. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting, the instrument center frequency is set to the nominal EUT channel center frequency enable the EUT transmit continuously.
3. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peak level of the in-band emission and all spurious
   RBW = 100 kHz, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Allow the trace to stabilize, use the peak and delta measurement to record the result.
5. The level displayed must comply with the limit specified in this Section.
6. Repeat above procedures until all frequencies measured were complete and submit all the plots.

Limit:

Frequency Range MHz	Limit (dBc)
30-25000	-20

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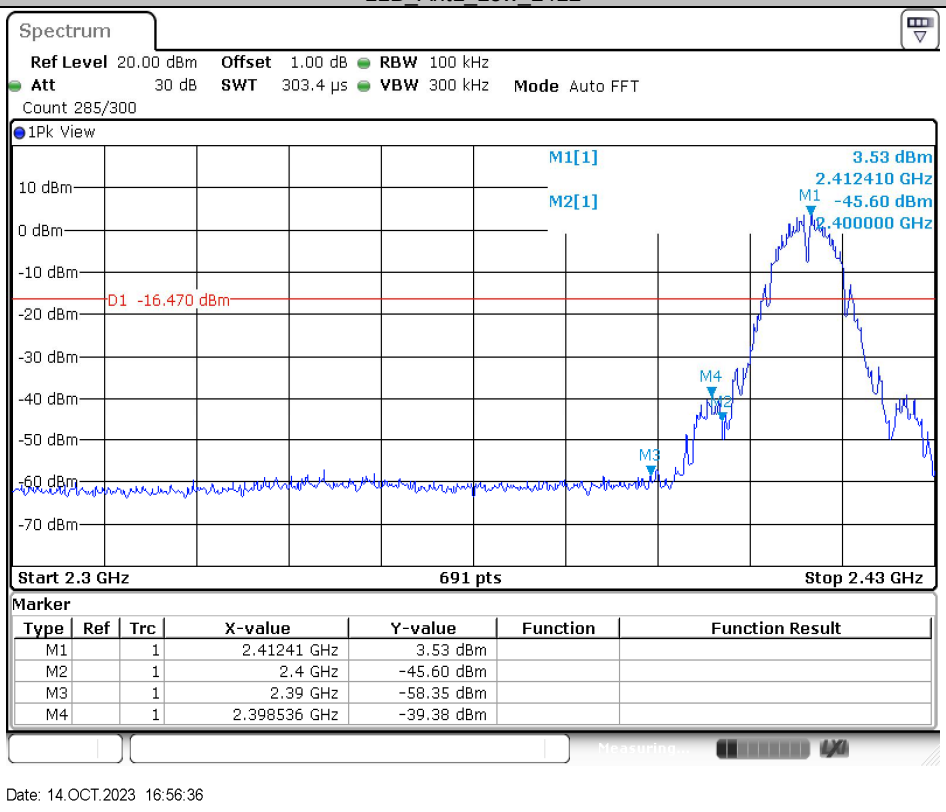
Band edge testing

TestMode	Antenna	ChName	Channel(MHz)	RefLevel(dBm)	Result(dBm)	Limit(dBm)	Verdict
11B	Ant1	Low	2412	3.53	-39.38	<=-16.47	PASS
		High	2462	2.98	-57.45	<=-17.02	PASS
11G	Ant1	Low	2412	-0.22	-38.72	<=-20.22	PASS
		High	2462	0.00	-49.04	<=-20	PASS
11N20SISO	Ant1	Low	2412	-0.92	-38.2	<=-20.92	PASS
		High	2462	-0.56	-51.22	<=-20.56	PASS

11B_Ant1_Low_2412



11B_Ant1_High_2462

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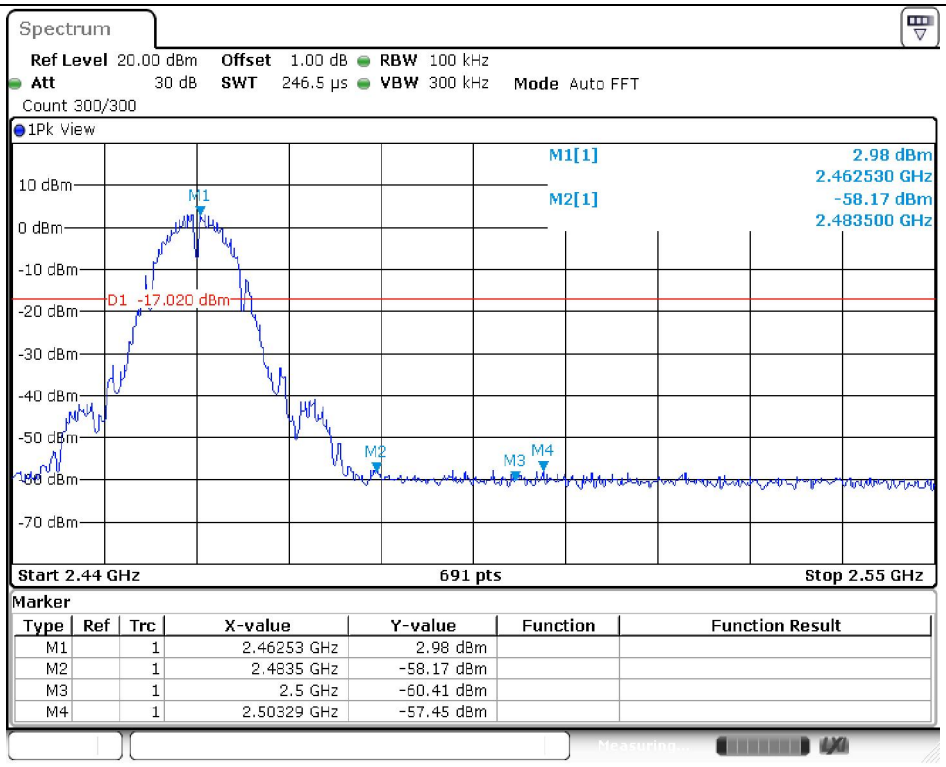
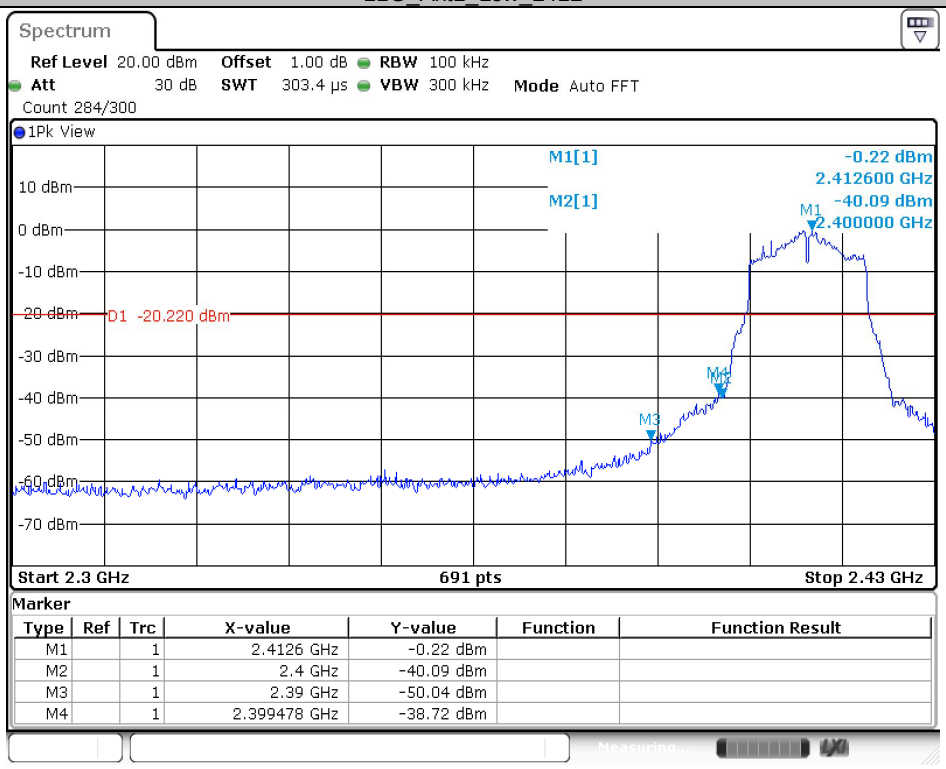
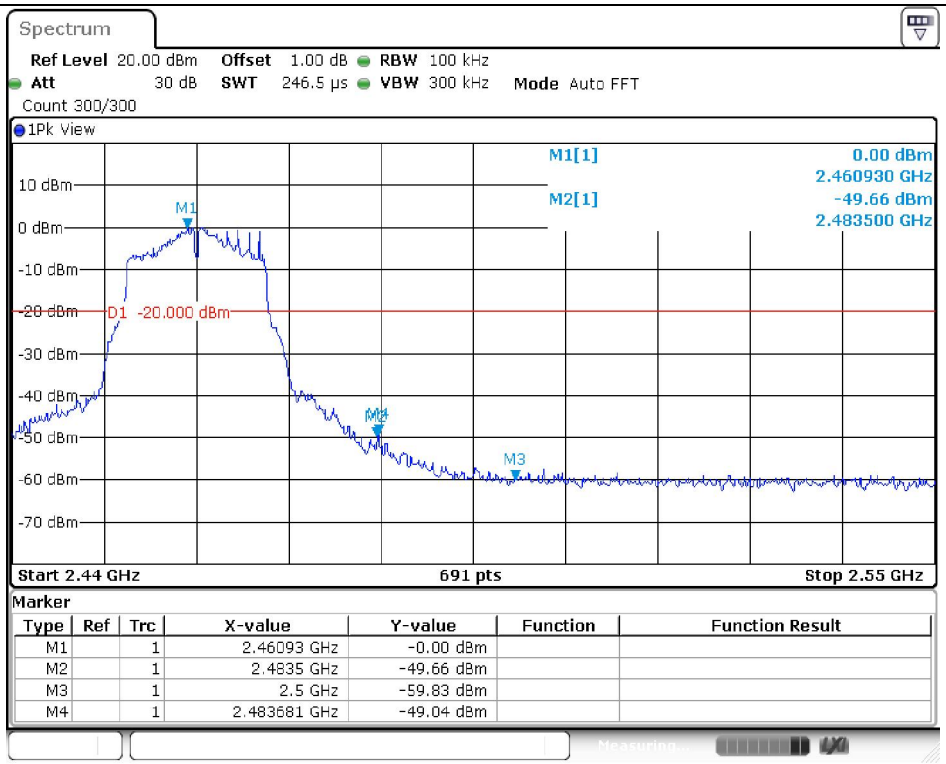


11G_Ant1_Low_2412

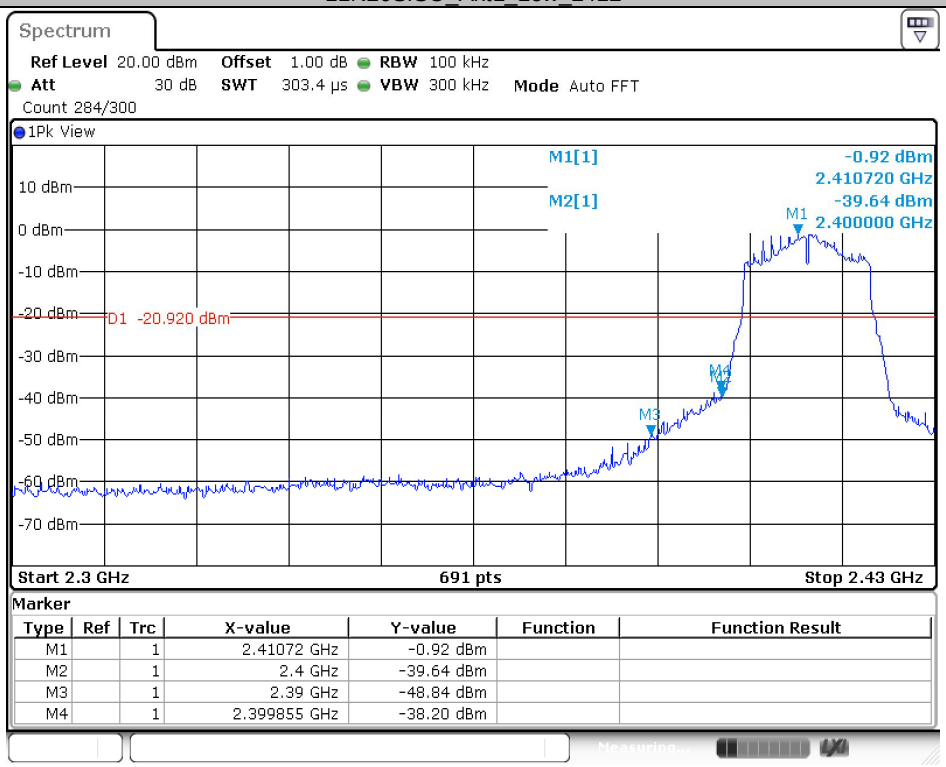


11G_Ant1_High_2462



Date: 14.OCT.2023 17:07:31

11N20SISO_Ant1_Low_2412



Date: 14.OCT.2023 17:09:20

11N20SISO_Ant1_High_2462

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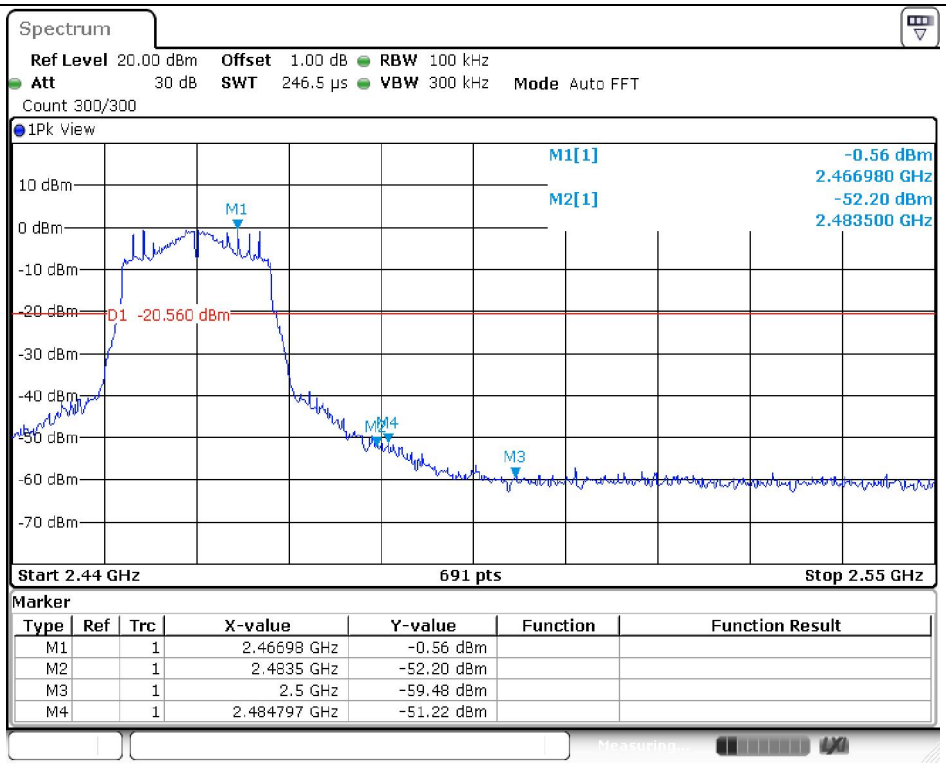

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9.8 Spurious Radiated Emissions for Transmitter

Test Method

1. The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
3. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. Use the following spectrum analyzer settings According to C63.10:

For Below 1GHz

Use the following test receiver settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 KHz to 120KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Peak unwanted emissions Above 1GHz:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Procedures for average unwanted emissions measurements above 1000 MHz

a) RBW = 1MHz.

b) VBW \ [3 × RBW].

c) Detector = RMS (power averaging), if [span / (# of points in sweep)] \ RBW / 2. Satisfying this condition can require increasing the number of points in the sweep or reducing the span. If the condition is not satisfied, then the detector mode shall be set to peak.

d) Averaging type = power (i.e., rms) (As an alternative, the detector and averaging type may be set for linear voltage averaging. Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.)

e) Sweep time = auto.

f) Perform a trace average of at least 100 traces if the transmission is continuous. If the transmission is not continuous, then the number of traces shall be increased by a factor of 1 / D, where D is the duty cycle. For example, with 50% duty cycle, at least 200 traces shall be averaged. (If a specific emission is demonstrated to be continuous—i.e., 100% duty cycle—then rather than turning ON and OFF with the transmit cycle, at least 100 traces shall be averaged.)

g) If tests are performed with the EUT transmitting at a duty cycle less than 98%, then a correction factor shall be added to the measurement results prior to comparing with the emission limit, to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:

1) If power averaging (rms) mode was used in the preceding step e), then the correction factor is [10 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 3 dB shall be added to the measured emission levels.

2) If linear voltage averaging mode was used in the preceding step e), then the correction factor is [20 log (1 / D)], where D is the duty cycle. For example, if the transmit duty cycle was 50%, then 6 dB shall be added to the measured emission levels.
3) If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission (AV) at frequency above 1GHz.

Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength μV/m	Field Strength dBμV/m	Detector	Measurement distance meters
0.009-0.490	2400/F(kHz)	48.5-13.8	AV	300
0.490-1.705	24000/F(kHz)	33.8-23.0	QP	30
1.705-30	30	29.5	QP	30
30-88	100	40	QP	3
88-216	150	43.5	QP	3
216-960	200	46	QP	3
960-1000	500	54	QP	3
Above 1000	500	54	AV	3
Above 1000	5000	74	PK	3

Note 1: Limit 3m(dBμV/m)=Limit 300m(dBμV/m)+40Log(300m/3m) (Below 30MHz)
Note 2: Limit 3m(dBμV/m)=Limit 30m(dBμV/m)+40Log(30m/3m) (Below 30MHz)

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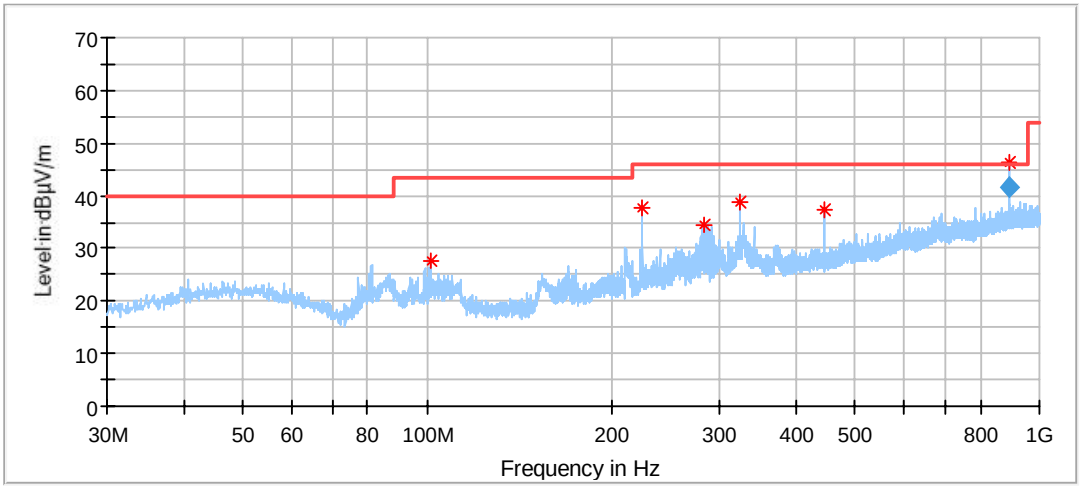
Spurious Radiated Emissions for Transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

The only worse case (802.11b) test result is listed in the report.

Transmitting spurious emission test result as below:

Below 1G:

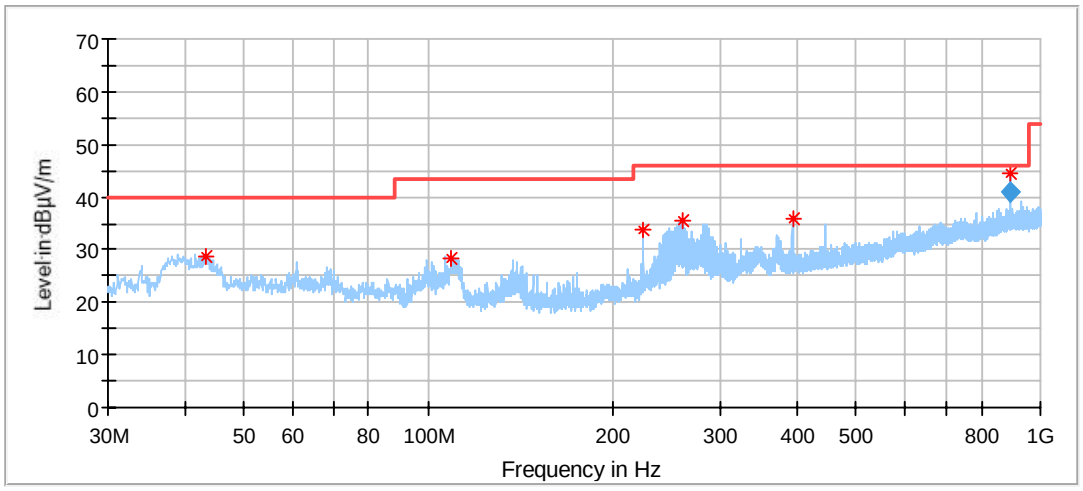


Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
101.672222	27.47	43.50	16.03	100.0	H	179.0	16.09
224.970000	37.84	46.00	8.16	100.0	H	260.0	16.45
283.385556	34.48	46.00	11.52	100.0	H	179.0	18.13
324.987778	38.72	46.00	7.28	100.0	H	260.0	19.36
445.052222	37.46	46.00	8.54	100.0	H	66.0	22.06
890.120556	46.18	46.00	-0.18	200.0	H	8.0	29.26

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
890.120556	41.80	46.00	4.20	200.0	H	8.0	29.26



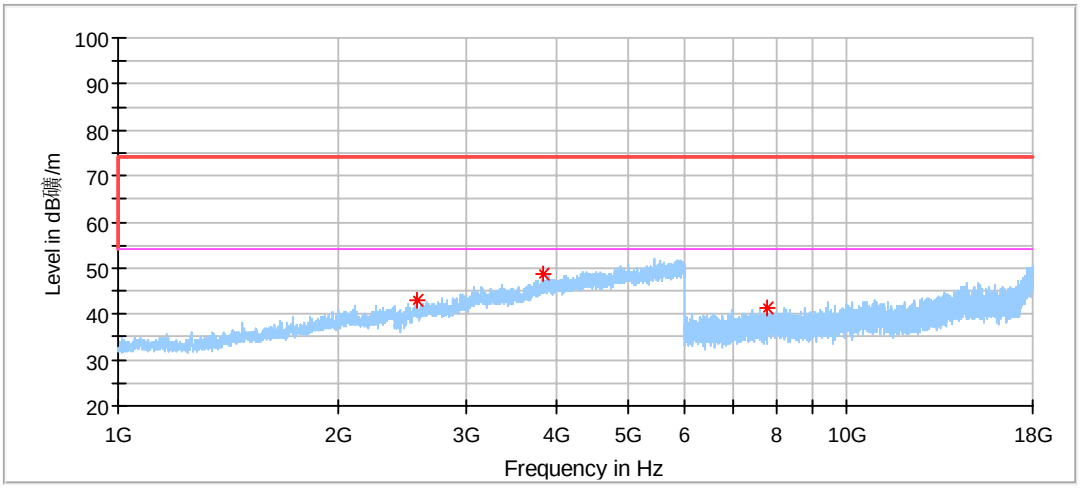
Critical_Freqs

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
43.364444	28.89	40.00	11.11	100.0	V	0.0	17.86
109.055000	28.52	43.50	14.98	100.0	V	261.0	15.63
224.970000	33.87	46.00	12.13	100.0	V	0.0	16.45
260.536667	35.51	46.00	10.49	200.0	V	164.0	18.04
393.965556	35.79	46.00	10.21	100.0	V	5.0	21.19
890.120556	44.34	46.00	1.66	200.0	V	0.0	29.26

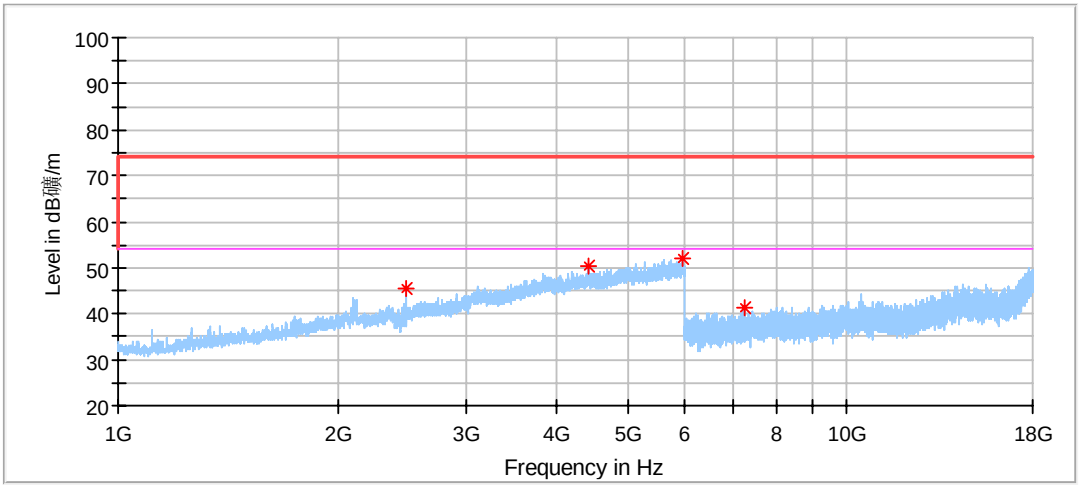
Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
890.120556	41.10	46.00	4.90	200.0	V	0.0	29.26

1GHz -18GHz:
2412MHz:



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2568.500000	43.13	74.00	30.87	150.0	H	0.0	-3.64
3835.500000	48.92	74.00	25.08	150.0	H	1.0	2.73
7799.500000	41.49	74.00	32.51	150.0	H	219.0	9.09



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3060.000000	46.73	74.00	27.27	150.0	V	200.0	-0.74
4213.000000*	48.32	74.00	25.68	150.0	V	323.0	3.59
7238.000000*	45.14	74.00	28.86	150.0	V	203.0	8.04

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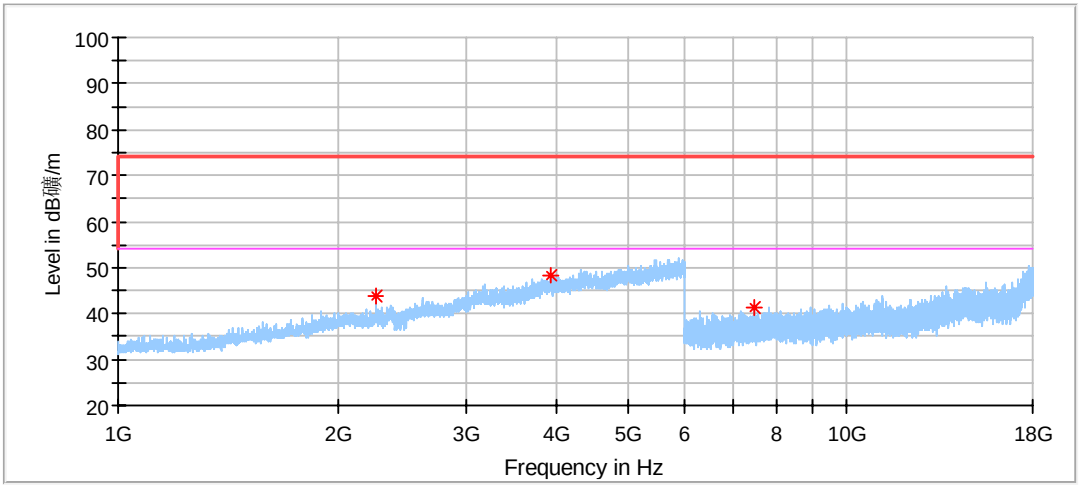
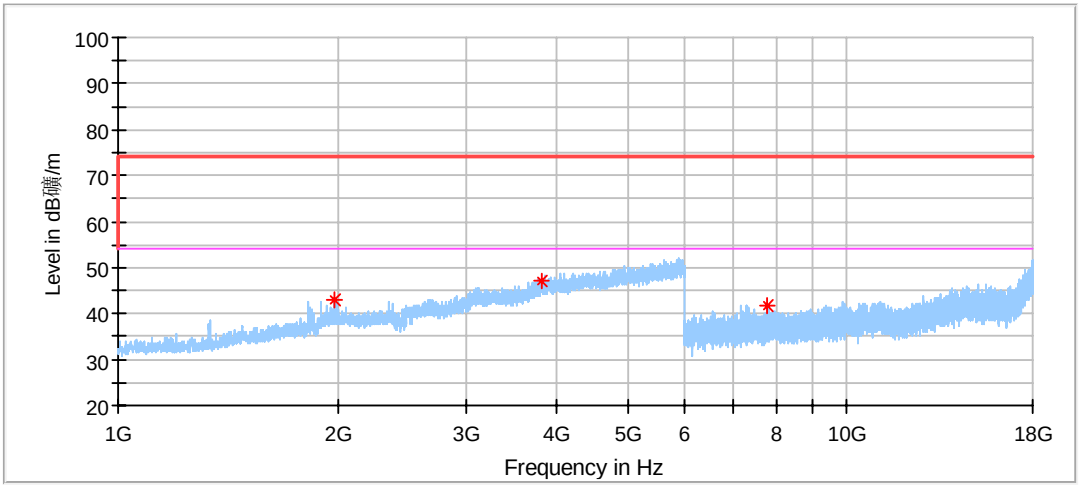
2437MHz:

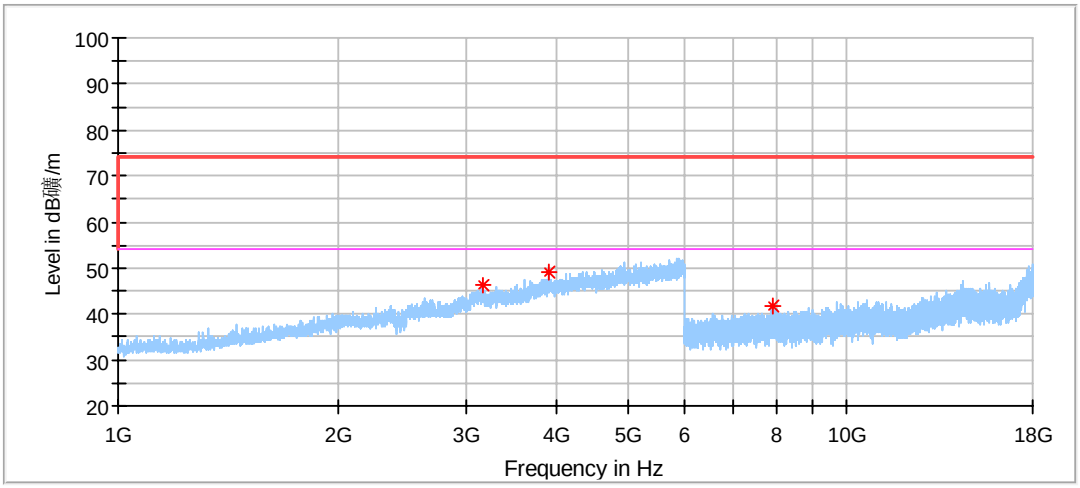


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2262.500000*	43.68	74.00	30.32	150.0	H	21.0	-5.29
3925.000000*	48.29	74.00	25.71	150.0	H	356.0	2.90
7449.500000*	41.40	74.00	32.60	150.0	H	258.0	8.16

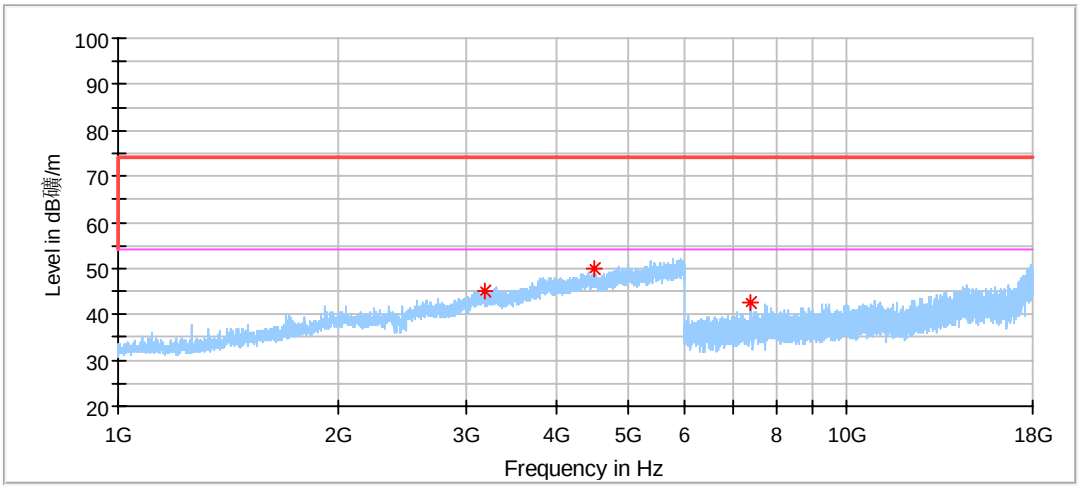


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1979.000000	42.91	74.00	31.09	150.0	V	34.0	-6.39
3815.000000*	47.17	74.00	26.83	150.0	V	267.0	2.66
7805.000000	41.80	74.00	32.20	150.0	V	314.0	9.08

2462MHz:

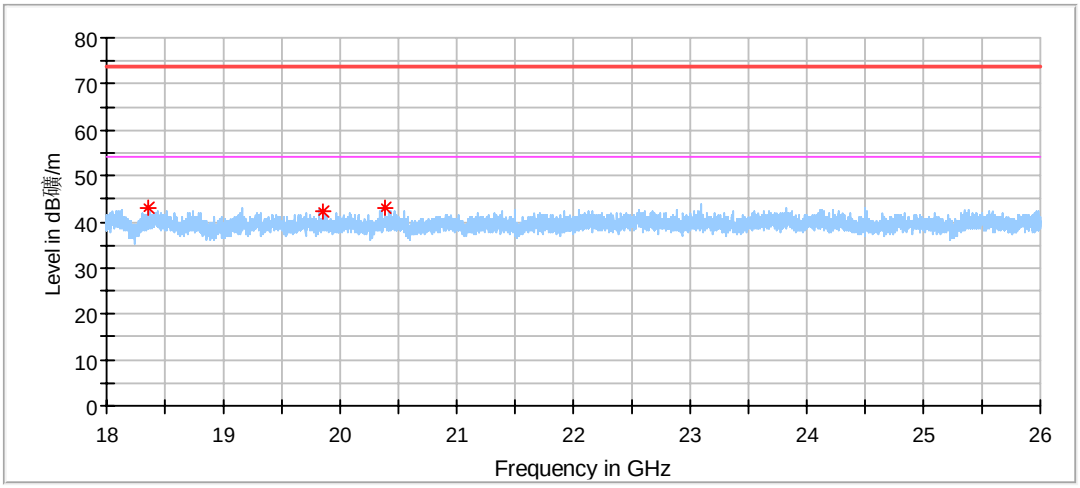


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3170.500000	46.33	74.00	27.67	150.0	H	267.0	-0.44
3898.000000*	49.25	74.00	24.75	150.0	H	321.0	2.96
7916.500000	41.91	74.00	32.09	150.0	H	175.0	9.00

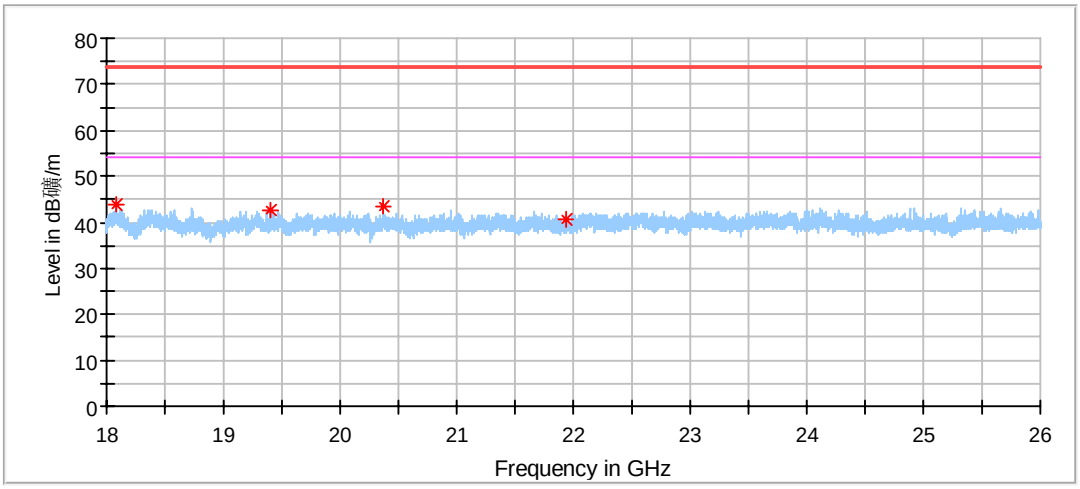


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
3192.500000	45.06	74.00	28.94	150.0	V	280.0	-0.43
4494.000000	50.02	74.00	23.98	150.0	V	34.0	4.62
7387.500000*	42.39	74.00	31.61	150.0	V	175.0	8.10

18GHz -40GHz:
2412MHz:

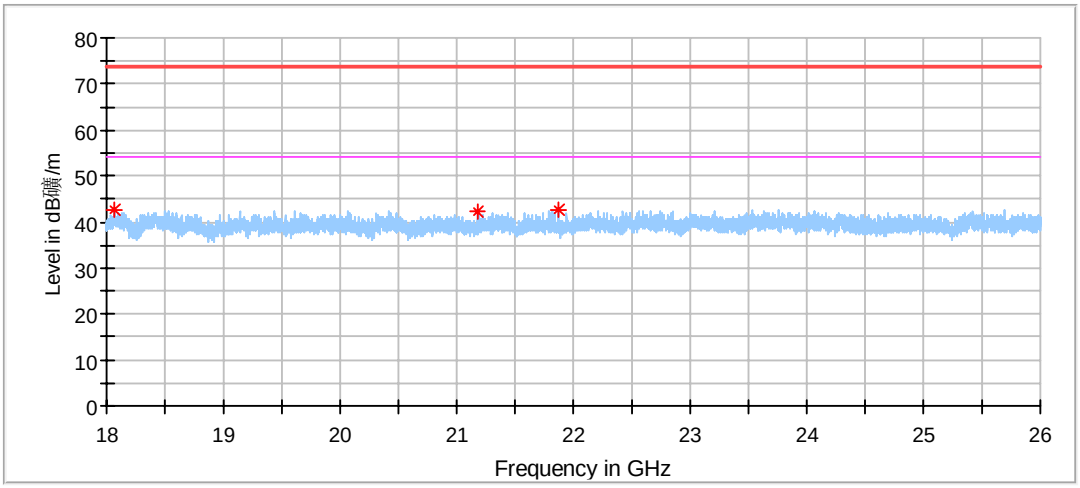


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18353.600000*	43.15	74.00	30.85	150.0	H	195.0	-1.82
19854.400000*	42.39	74.00	31.61	150.0	H	230.0	-0.88
20384.800000*	43.08	74.00	30.92	150.0	H	183.0	-0.39

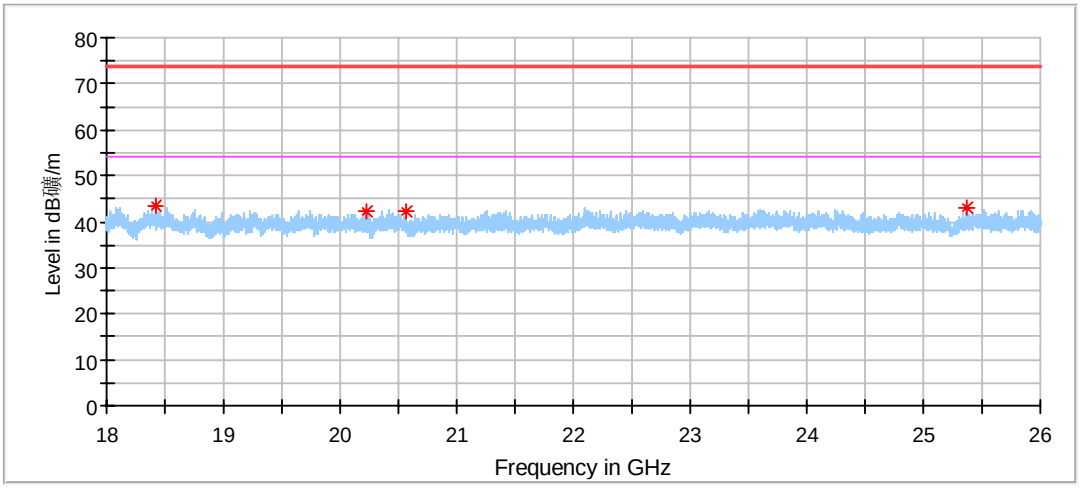


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18075.200000*	43.76	74.00	30.24	150.0	V	0.0	-1.84
19403.200000*	42.66	74.00	31.34	150.0	V	92.0	-1.38
20366.400000*	43.34	74.00	30.66	150.0	V	259.0	-0.41
21933.600000	40.79	74.00	33.21	150.0	V	148.0	0.77

2437MHz

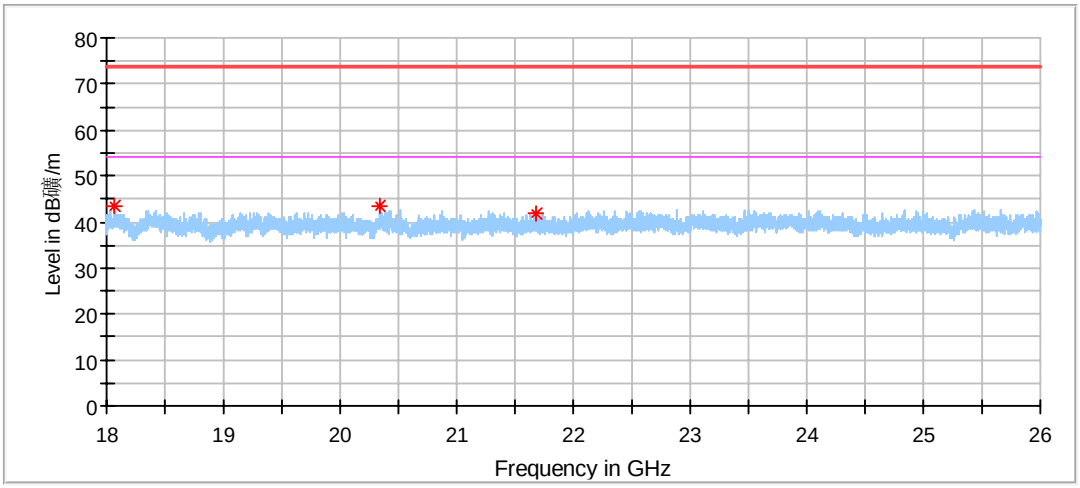


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18068.000000*	42.72	74.00	31.28	150.0	H	13.0	-1.86
21176.800000*	42.46	74.00	31.54	150.0	H	143.0	0.34
21865.600000	42.83	74.00	31.17	150.0	H	290.0	0.72

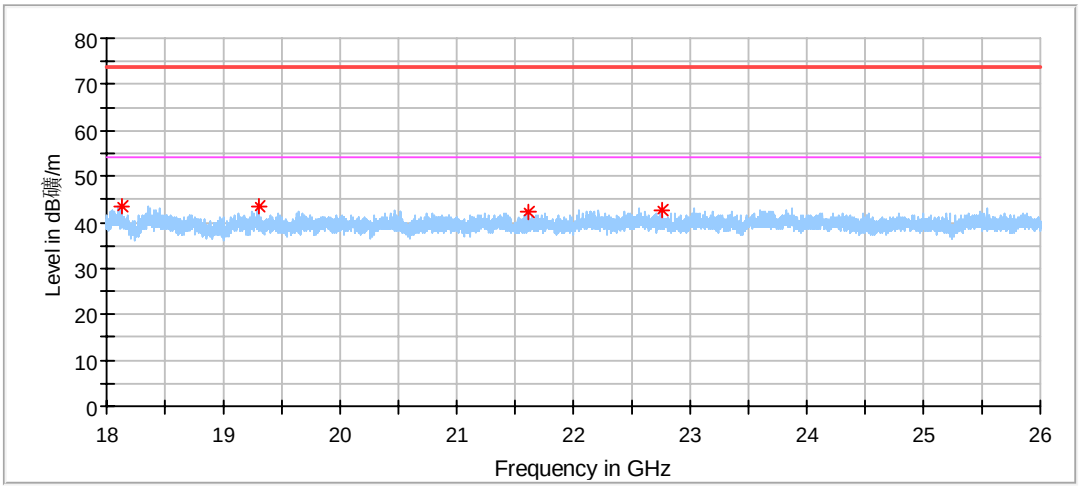


Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18421.600000*	43.33	74.00	30.67	150.0	V	216.0	-1.73
20220.800000*	42.44	74.00	31.56	150.0	V	157.0	-0.65
20556.800000*	42.34	74.00	31.66	150.0	V	266.0	-0.25
25363.200000	43.14	74.00	30.86	150.0	V	200.0	2.22

2462MHz



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18068.000000*	43.41	74.00	30.59	150.0	H	132.0	-1.86
20340.000000*	43.33	74.00	30.67	150.0	H	212.0	-0.45
21680.800000	41.83	74.00	32.17	150.0	H	358.0	0.58



Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
18128.800000*	43.60	74.00	30.40	150.0	V	290.0	-1.67
19313.600000*	43.43	74.00	30.57	150.0	V	247.0	-1.72
21618.400000	42.31	74.00	31.69	150.0	V	282.0	0.52
22756.000000	42.53	74.00	31.47	150.0	V	191.0	1.62

Remark:

(1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
(2) Data of measurement within frequency range 9kHz-30MHz are the noise floor or attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so test data does not present in this report.
(3) The report only shows the worst test data.
(4) Level= Reading Level + Correction Factor
(5) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain
Below 1GHz: Corrector factor = Antenna Factor + Cable Loss
(The Reading Level is recorded by software which is not shown in the sheet)

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10 Test Equipment List

Radiated Emission Test(9K – 30MHz)

Description	Manufacturer	Model no.	Equipment ID	Serial no.	cal interval (year)	cal. due date
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2024-5-20
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	68-4-80-14-002	707	1	2024-7-18
Loop Antenna	Rohde & Schwarz	HFH2-Z2	68-4-80-14-006	100398	1	2024-5-28
Pre-amplifier	Rohde & Schwarz	SCU 18	68-4-29-14-001	102230	1	2024-8-7
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	1	2024-5-19
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2	2024-5-19
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A	N/A

Radiated Emission 2# Test(30MHz – 40GHz)

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	68-4-74-14-002	101269	1	2024-5-20
Wave Guide Antenna	ETS	3117	68-4-80-19-001	00218954	1	2024-3-5
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-001	100745	1	2024-4-26
Pre-amplifier	Rohde & Schwarz	SCU 18F	68-4-29-19-002	100746	1	2024-5-19
Sideband Horn Antenna	Q-PAR	QWH-SL-18-40-K-SG	68-4-80-14-008	12827	1	2024-5-19
Pre-amplifier	Rohde & Schwarz	SCU 40A	68-4-29-14-002	100432	1	2024-7-11
Attenuator	Mini-circuits	UNAT-6+	68-4-81-21-002	15542	1	2024-8-1
3m Semi-anechoic chamber	TDK	SAC-3 #2	68-4-90-19-006	----	2	2024-5-19
Test software	Rohde & Schwarz	EMC32	68-4-90-19-006-A01	Version10.35.02	N/A	N/A

Conducted Emission 2# Test

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	68-4-74-19-002	102590	1	2024-5-19
LISN	Rohde & Schwarz	ENV216	68-4-87-19-001	102472	1	2024-5-20
Attenuator	Shanghai Huaxiang	TS2-26-3	68-4-81-16-003	080928189	1	2024-5-19
Test software	Rohde & Schwarz	EMC32	68-4-90-19-005-A01	Version10.35.02	N/A	N/A
Shielding Room	TDK	CSR #2	68-4-90-19-005	----	3	2025-10-15

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Conducted RF Test System

DESCRIPTION	MANUFACTURER	MODEL NO.	EQUIPMENT ID	SERIAL NO.	CAL INTERVAL (YEAR)	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	68-4-74-14-004	101030	1	2024-5-19
Test software	Tonscend	System for BT/WIFI	68-4-74-14-006-A13	Version 2.6.77.0518	N/A	N/A
Shielding Room	TDK	TS8997	68-4-90-19-003	----	3	2025-10-15

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty	
Test Items	Extended Uncertainty
Uncertainty for Conducted Emission 150kHz-30MHz (for test using AMN ENV432)	3.15dB
Uncertainty for Radiated Spurious Emission 9kHz-30MHz	4.70dB
Uncertainty for Radiated Spurious Emission 30MHz-1000MHz	Horizontal: 4.79dB; Vertical: 4.79dB;
Uncertainty for Radiated Spurious Emission 1000MHz-18000MHz	5.11dB;
Uncertainty for Radiated Spurious Emission 18000MHz-40000MHz	5.10dB;
Uncertainty for Conducted RF test with TS 8997	RF Power Conducted: 1.31dB Frequency test involved: 0.6×10^{-8} or 1%

Measurement Uncertainty Decision Rule

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115: 2021, clause 4.4.3 and 4.5.1.

---THE END OF REPORT---

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